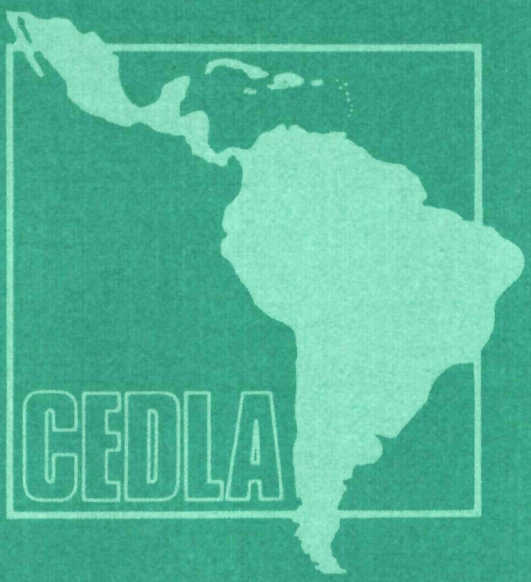
Wilma Roos

Shaping Brazil's Petrochemical Industry, The Importance of Foreign Firm Origin in Tripartite Joint Ventures



LATIN AMERICA STUDIES

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SHAPING BRAZIL'S PETROCHEMICAL INDUSTRY, THE IMPORTANCE OF FOREIGN FIRM ORIGIN IN TRIPARTITE JOINT VENTURES

SHAPING BRAZIL'S PETROCHEMICAL INDUSTRY, THE IMPORTANCE OF FOREIGN FIRM ORIGIN IN TRIPARTITE JOINT VENTURES

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op het gebied van de sociale wetenschappen

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Wilma Roos

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Promotor : Prof. dr. G. Huizer

Co-promotor : Dr. D. Haude

PREFACE

In 1981, during my study Human Geography of Developing Countries, I had to chose a subject for my MA field research in Mexico. It was my intention to investigate the development prospects of the huge oil industry of this country and the involvement of various enterprises in this sector. My supervisor at that time, dr. Otto Verkoren -realistically estimating the research a student going to a Third World country for the first time can do -advised me to concentrate on a somewhat smaller type of enterprise first. It would not only be easier but also far cheaper, since their would be less need in the small Mexican companies to offer expensive business lunches in order to obtain the information. Under his supervision I gained a great deal of experience with industry oriented research in the Third World. Meanwhile, I didn't let go of my wish to investigate larger firms in the oil industry or sectors related to it, and their impact on industrial development. Thus, I was very glad to have the opportunity to become a temporary research assistant at the Third World Center of the University of Nijmegen. From 1987 till 1991 I carried out the research presented here which deals with the functioning of the tripartite developmental model -consisting of joint ventures between large foreign companies, state firms and national private firms- in the petrochemical industry in Brazil.

At the time I started the research about four years ago, the increasing internationalization of world production had intensified the discussion on the role of multinational enterprises. Besides this, democratization was taken place in a number of countries in Latin America, amongst which Brazil was one of the earliest. In short, all ingredients were present to make this a challenging research project.

The first thing I was confronted with in Brazil was its warmth and hospitality. Business executives, employees of government institutes and other researchers were so kind as to spend hours sitting with me, answering my almost endless row of questions, without expecting me to buy a lunch. I, therefore would like to thank the representatives of national chemical enterprises, of foreign chemical companies and of state institutions -the Petroquisa directors in particular- for providing me some insight into Brazil's petrochemical industry. The days I spend at the IBASE office in Rio de Janeiro proved to be very useful as well.

In addition, I would like to thank João Bosco Feres, Rute Rios, Roberto and José Renato, who provided me with some key informants and, in particular, showed me a Brazil that I will never forget. Furthermore I greatly appreciated the hospitality of Nel Vijzelman in Rio de Janeiro and Jan and Maria van der Berg in São Paulo who helped me to feel comfortable in huge world cities in which one can easily get lost.

It is impossible to thank all persons who were of great help during my two field researches in Brazil, but the last persons who meant a great deal to me and showed me the other side of Brazil, the side unknown by most of the managers, executives and government employees I interviewed, are the street children represented on the 'Secundo Congresso Nacional de Meninos e Meninas da Rua' in Brasilia. They

taught me about the difficulties of staying alive in a Third World country characterized by extreme differences in wealth such as Brazil. I do hope that the benefits of industrial development will one day reach and enrich the lives of Damião, Theresa, Fransico, and all the other children presently living on the streets of Rio, São Paulo, Salvador and other Brazilian cities.

After returning from my final field research trip -the Brazilian 'forro' still in my ears- I was confronted with the task of writing a PhD thesis. Thanks to the support of my colleague's at the Third World Center, and not the least some friends at the Department of Anthropology and the Peace Research Center, to commute from Utrecht to Nijmegen never became a burden. I would like to thank them, in particular for the tea breaks in which a needed distance from the research could be taken. I would further like to thank Kees Koonings, from the State University of Utrecht, who, despite his full agenda, always found time to discuss the processes of industrialization in Brazil with me. I wish to thank Karin Fierke, for correcting my English, Wilbert Kruijsen for the lay-out and Yvonne and Roel for designing the maps and figures. The pleasures of living in a house together with Ciska, Marga and Margreet, who followed the progress of my research with never lasting interest, as well as the support given to me by my family, certainly contributed to the result.

But this thesis would never have been completed within the four years as 'Assistant in Opleiding', without the help of Omer van Renterghem, who not only assisted me during the field researches in Brazil, but also made critical comments on the entire text. Despite the fact that his comments on the chapters were sent to me all the way from Sudan, he followed the process from nearby.

Wilma Roos
Utrecht, 1st April 1991

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List of abbreviations

ABIFINA	Associação Brasileira das Industrias de Quimica Fina; Brazilian Association of Fine Chemical Industry
ABIQUIM	Associação Brasileiro da Industria Quimicas y de Produtos Derivados; Brazilian Association of Chemical Industrial Products and Derivates
BEICIP	Bureau des Estudes Industrièlles et de Cooperacion; Office of Industrial Research and Cooperation
BNDES	Banco Nacional de Desenvolvimento Economico e Social; Nacional Bank for Economic and Social Development
CDI/SDI	Conseilho/Secretaria de Desenvolvimento Industrial; Council/ Secretary of Industrial Development
CEPED	Centro de Pesquisa e Desenvolvimento; Research and Development Institute
CIA	Centro Industrial de Aratú; Industrial Centre of Aratú
CIP	Conselho Interministerial de Preços; Interministerial Council of Prices
CLAN	Consultora e Planejamento; Consultancy and Planning
CENPES	Centro de Pesquisa de Petrobras; Research Centre of Petrobras
CNP	Conseiho Nacional de Petroleo; National Council of Oil Industry
CNPq	Centro Nacional de Pesquisa; Nacional Research Centre
COFIC	Comitê de Fomento Industrial de Camaçari; Committee of the Industrial Foundation of Camaçari
COPEC	Complexo Petroquimico de Camaçari
COPENE	Companhia Petroquimica do Nordeste; Northeastern Petrochemical Company
COPESUL	Companhia de Petroquimica do Sul; Southern petrochemical company
COPPERJ	Companhia de Polo Petroquimico de Estado de Rio de Janeiro; Company of the Petrochemical Complex of the State Rio de Janeiro
CUT	Central Unica dos Trabalhadores, National Workers Organization
FIERGS	Federação das Industrias de Estado Rio Grande do Sul; Federation of Industries of the State Rio Grande do Sul
FIESP	Federação das Industrias de Estado de São Paulo; Federation of Industries of the State São Paulo
FINAC	Programma de Financiamento de Acionistas; Financing Programme for Shareholders
FINEP	Financiadora de Estudos e Projetos; Financing Institute of Research and Projects
FINOR	Fundo de Investimento do Nordeste, Investment Fund for the Northeast

IBASE	Instituto Brasileiro de Análises Sociais e Económicas; Brazilian Institute of Social and Economic Analysis
IBGE	Fundação Instituto Brasileiro de Geografia e Estatística; Geographical and Statistical Brazilian Institute
INPI	Instituto Nacional de Programma Industrial; Nacional Institute of Industrial Programmes
IUPERJ	Instituto de Posgraduação de Rio de Janeiro; Post Graduate Institute of Rio de Janeiro
ICM	Imposto sobre Circulação de Mercadorias; Value Added Tax
MOL	Werkgroep Multinationale Ondernemingen Latijns Amerika; Committee of Multinational Enterprises in Latin America
Petrobras	Petroleo Brasileiro
PIS/PASEB	Programmas de Integração Social/ Formação de Patrimonio de Servidor Publico; Programme of Social Integrating/ Formation of Patrimony of Public Services
PqU	Petroquimica União
Sindipetro	Sindicato de Produtos Petroleos; Employers Union of Petrochemical products
Sinproquim	Sindicato das Industriais de Produtos Quimicos para Fins Industriais da Petroquimica; Employers Union of Chemical Products used in the Petrchemical Industry
SNI	Serviçio Nacional de Informação; National Information Service
SOMO	Stichting Onderzoek Multinationale Ondernemingen; Centre for Research on Multinational Corporations
STI	Secretaria de Tecnologia Industrial; Secretary of Industrial Technology
SUDENE	Superintendencia Desenvolvimento do Nordeste; Secretary of Development of the Northeast
UFBA	University Federal de Bahia; Federal University of Bahia

1

INTRODUCTION

Of all Latin American countries, Brazil is a favourite of foreign investors. Much has been written about the attractiveness of this huge country: its large elite, eager to buy durable consumer goods and its extensive mineral resources, varying from rare kinds of wood to iron ore. During the so-called Brazilian miracle in particular, the period between 1967 and 1973, when GNP growth exceeded 10% annually, Brazil was highly attractive to foreign investors. Even in the period thereafter, when the favourable growth figures were replaced by booming inflation and an insurmountable external debt, foreign entrepreneurs were still optimistic about the profitability of investments in this country, which is illustrated by the common expression: "Brazil is the country of the future". After the external debt mounted to 118 billion US dollars in 1989 this expression could still be heard, though with one alteration: "Brazil is the country of the future, and it will always remain the country of the future". Undoubtedly, Brazilian and foreign entrepreneurs were no longer certain that Brazil would have a brilliant future.
Despite the deteriorating economic situation in the country, the economic miracle has been so remarkable that it inspired many scientists to search for explanations of the impressive economic growth and the role of foreign firms.

In chapter two, the theoretical part, the work of some of these researchers, in particular Evans will be examined. Based on theories of dependent development, Evans analyses the industrial development of Brazil using the concept of the triple alliance, i.e. alliances between state capital, national private capital and foreign capital. Evans evaluates this concept on an empirical level in the petrochemical sector in Brazil where tripartite joint ventures were stimulated by the Brazilian government. Tripartite joint ventures are companies in which state, national and foreign firms participate with a more or less equal number of shares. The role foreign firms played in the industrial growth of Brazil is a central issue in the research of Evans, which is why his ideas provide a good starting point for the analysis of this present research. A brief description of the ideas of Evans will be presented, with special reference of the concept of the triple alliance.

Although Evans provides an extensive description of the extent to which foreign firms contributed to the dependent development of the country, he makes little distinction between foreign firms from different countries. Pointing to the fact that historically investment patterns of foreign countries have differed, Evans stresses that foreign firms have one common goal, which is global capital accumulation. According to him, differences between foreign investors, as far as they exist, will not have a significant impact on development in Brazil.

Since this view insufficiently explains the role played by different foreign firms in Brazil, theories of international business will be examined as well. The first important contribution providing insight into the impact of foreign firm origin on

economic development, is from Kojima. He compares the impact of Japanese and American foreign investments on economic development in host countries.

His hypothesis is solely macro-economic in nature, however, and neglects the micro-economic aspects of firms. These micro-economic aspects are important for understanding the role of foreign firms in Brazilian industrial development. In chapter two attention will be paid to scientists who focus on firm level on aspects such as firm organisation, management structure and corporate culture. Special emphasis will be given to the performance of joint ventures, since the tripartite joint venture is a crucial element of the triple alliance concept. Authors such as Beamish, Kogut, Dunning and Nakase will be discussed.

Following from these theoretical assumptions, the research objective is formulated. This research departs from the theoretical assumptions of Evans in order to compare his findings with those of authors of the international business theories, such as Kojima and Dunning. To enable an empirical evaluation of the concept of the triple alliance, an analysis will be made of the way the Brazilian government applied the strategy of the triple alliance to stimulate the development of the petrochemical industry. The objective of this research can be summarized as follows:

> "To analyze the contribution of the constellation of the triple alliance to the development of the petrochemical industry of Brazil in general and the petrochemical complex of Camaçari in particular in the previous fifteen years with special emphasis on the implications of the origin of the foreign partner."

The petrochemical industry in Brazil has been chosen for this case study for two reasons: first, in order to examine the extent to which the theories of international business can increase understanding of the triple alliance concept, as developed by Evans; and second to examine the degree to which the government policy of using tripartite joint ventures to stimulate industrial growth, has been successful. The development of the petrochemical industry in Brazil will be the subject of chapter three. The integrated character of the chemical sector -to which the petrochemical branch belongs- will be outlined, followed by a brief description of the development of this industry on a world scale and Brazil's place in the global ranking of petrochemical producers. Figures relating to the demand and production of the various petrochemical products, import and export, and balance of trade will be presented to illustrate Brazil's position. The petrochemical firms responsible for the production of petrochemical products in Brazil are located in three petrochemical complexes. The first complex spontaneously developed in the sixties in the São Paulo region; the second complex, situated in the northeast of Brazil, was planned by the government in the seventies, as was the third petrochemical complex in Rio Grande do Sul, in the extreme south of the country, which came on stream in the beginning of the eighties. At present, as part of the National Petrochemical Programme (PNP), a fourth complex is planned to accommodate the increased demand for petrochemicals. This programme includes a proposal to duplicate the size of the second complex as well.

The emphasis of chapter four will be on the importance of the triple alliance strategy for the development of the Brazilian petrochemical industry. Evans con-

cludes that alliances between state enterprises, national private enterprises and foreign firms determined the development of the petrochemical industry of Brazil. In this chapter, attention will be paid to the role played by this triple alliance. During the creation of the second and third petrochemical complex explicit efforts were made by the government to apply a tripartite model. As a result, all new petrochemical companies must be tripartite joint ventures. Ten years after the second petrochemical complex came on stream, it became clear that the functioning of the tripartite model is not static by nature. The relationship between the three participating partners is subject to drastic and continuous change. A closer look at the changing relative importance of the participating companies provides a better understanding of the functioning of the tripartite model and the role foreign firms play in this model. Before an overall evaluation can be made, it is necessary to describe the respective partners. The state partner will first be examined, including the creation of state institutes, the changing importance of the state technocracy and, finally, the state enterprise in the chemical sector, Petroquisa.

Second, the role of the national private entrepreneur will be outlined. Before the tripartite model was implemented, the petrochemical industry was dominated by foreign firms and a few national entrepreneurs. The launching of the second and third complex provided the impetus for national entrepreneurs to invest in petrochemical companies. In addition to existing national entrepreneurs in the sector, several newcomers, from other sectors of the economy such as the financial and construction sector, started to invest in the petrochemical complexes.

The third and -for this research- most important partner in the tripartite model, is the foreign company. The final section of chapter four is dedicated to the role of foreign firms in the Brazilian petrochemical production. Special emphasis is placed on the increasing relative importance of Japanese companies within this sector. Before the two petrochemical complexes were established in Brazil, Japanese chemical companies were completely absent. After a request from the Brazilian government they invested in several petrochemical firms. Nonetheless, European and American firms remain the largest contributors to Brazil's petrochemical industry.

The impact of the tripartite model on industrial development and the role of foreign firms, will be examined on the basis of one petrochemical complex of Brazil, the second complex of Camaçari, located in north eastern state of Bahia. In chapter five, facts and figures concerning the Camaçari complex and the companies located in this complex will be presented, beginning with the number of firms and the chemical branch to which they belong. Second, production volume, net profits and profitability of all individual firms in the complex will illustrate the importance of the complex in the petrochemical sector. Finally, the duplication of the Camaçari complex as designed in the National Petrochemical Programme (PNP), will be examined.

The government policy of stimulating tripartite joint ventures largely influenced the ownership structure of the Camaçari firms. Despite this policy, not all companies on the complex are owned by three partners. Some of the firms are bipartite joint

ventures and some are even completely privately owned. More details about the fluctuating nature of the tripartite model will be given in chapter six. Regarding the origin of capital investments, the participating companies as well as various government and private finance institutions played a decisive role in the provision of capital. Of these, the National Development Bank and the Developmental Organization Sudene will be described in more detail.

Finally, the regional impact of the Camaçari petrochemical complex will be described. The Brazilian government located the complex in a sparsely industrialized region, far away from the industrial heart of the country, in order to stimulate regional development. It was assumed that the positive spread effects and the forward and backward linkages of the petrochemical firms would stimulate industrial activities in the northeast of Brazil. In order to illustrate the impact of the complex on regional development, the origin of resources, destination of production, and employment figures will be examined, as well as the location of decisionmaking centers and the impact of the complex on technological development in the region. Finally, the contribution of value added taxes (ICM) to the income of the Bahian state government is used as an indication of regional development.

The actual functioning of the tripartite model in the Camaçari complex will be analyzed in chapter six. Stability of the model is the first aspect that will be dealt with. The theoretical chapter included a discussion of the influence of joint venture stability on the performance of industrial firms. Since the Camaçari firms are largely joint venture structures, the question of their stability is a very interesting one. Changes in the types of joint ventures and completely privately owned companies represented in Camaçari, will be described, with special reference to the participation of foreign transnational companies. Questions related to the nature of the transnationals found on the complex, changes in their number, and the differences between American, European and Japanese participants will be considered. In most cases the relationship between the partners is the cause of joint venture failure or changes in shareholder composition. Based on interviews with general managers and entrepreneurs, the factors responsible for the degree of stability of joint venture firms will be discussed in this chapter.

A second important aspect in the functioning of the tripartite model is technology transfer between joint venture partners in the Camaçari complex. As will be seen, the Brazilian government, in adapting the tripartite model, had certain objectives relating to technology transfer. The findings of various researchers who have measured the impact of the tripartite model on technological development will be presented, and compared with the results of the present research. Three aspects: the origin of the first used technology, investments in R&D and the origin of technology used for the expansion of production capacity will be examined.

All three participants play a role in the transfer of technology. It is, therefore, important to look more closely at the influence of these three partners on technology transfer. Firstly, the role of government policy and state participation will be described. Secondly, attention will be paid to the attitude of the national petrochemical firms toward national R&D. Finally, the most important partner in technology

transfer will be looked at: the foreign partner which is the provider of almost all technology needed in the petrochemical firms. Can differences be discerned in the behaviour of European, Japanese and American transnationals? The impact of foreign firm origin will be looked at in relation to the three aspects of technology transfer: purchase of first technology, investments in R&D and the possibility of expanding production with self improved technology.

Chapter seven provides more detail about the attitudes of participating transnationals and special attention is paid to differences between various foreign firms. First, investment patterns of the European, Japanese and American transnationals in Brazil will be compared, focussing on the different periods in which investments were made as well as sectoral preferences of the respective foreign firms.
After describing this general pattern, the remainder part of the chapter concentrates on foreign participation in the joint ventures at the Camaçari complex, with special attention to firm organization. First, the motives for investing in the joint ventures at Camaçari will be compared. In the theoretical chapter it is argued that motives for entering a joint venture can have a decisive impact on its stability. Second, the decisionmaking structure and the corporate culture of the Brazilian participant, on the one hand, and the European, American and Japanese participant on the other, will be dealt with.

This chapter ends by analyzing the extent to which differences in investment patterns, attitude towards participation in joint ventures, organizational structure and corporate culture determine stability and technology transfer. In the final chapter, a summary is presented and conclusions are drawn. The assumptions in the theoretical chapter are compared with the results of the empirical case study, providing a brief picture of development prospects for the tripartite model in the petrochemical complex of Camaçari.

2

THEORETICAL ASSUMPTIONS: THE ROLE OF MULTINATIONAL ENTERPRISES IN THE TRIPLE ALLIANCE IN BRAZIL

2.1. Introduction

The impressive industrial development of Brazil during the seventies, has gained the attention of scientists dealing with questions of development and Third World countries. A developing country, characterized by GNP growth figures averaging 10% in the seventies, with an industrial sector producing advanced capital goods as well as durable and non-durable consumer goods, is a rare phenomenon in the Third World. Brazil not only reached a stage in which internal consumption was largely satisfied by national produced goods; the share of manufactured products in the total exports also increased considerably. Various authors have analysed explanations for this impressive industrial development. In sections 2.3. and 2.4. of chapter two the work of some of these authors will be examined. Special emphasis will be placed on authors belonging to the dependencia tradition and, above all, on the dependent development school. Although Cardoso introduced the theory of 'associated dependent development', Peter Evans[1], using the theoretical concept of the 'triple alliance', provided a starting point for analyzing industrial development of Brazil in this present research. According to Evans industrial development in a peripheral country is possible if alliances are created between foreign capital, national private capital and state capital, the triple alliances. This industrial development is still largely determined by the so-called center countries, however. The findings of Evans have been used and analysed by several other authors, among others, in publications dealing with industrial development in Mexico (Gereffi, Manghalagiri)[2] and in other Latin American countries (Gwynn).[3] Although Evans consideres the contribution of the triple alliance to be one of the most important aspects of dependent development, he also remarks that this alliance consists of a rather delicate balance: the three partners certainly have common interests but at the same time they are strongly divided by conflicts. These conflicts could, in the end, result in a failure of the strategy of triple alliance.

Evans pays a great deal of attention to contradictions within the state capital and within the national industrial bourgeoisie which he consideres to be a threat to the continuation of the triple alliance strategy. The role of the foreign partner has, however, been somewhat neglected in his analysis: he refers to the third participant as a homogeneous group of foreign firms characterized by one common goal: the maximalisation of global capital accumulation. Although certain similarities between the investing foreign firms cannot be denied, differences should not be underestimated. Increasing internationalization has meant that foreign firms from a number

of different countries are investing in the periphery. During the thirties and forties primarily American companies invested their capital in countries outside the US; in the fifties and sixties foreign direct investments from Europe became increasingly important. When in the sixties and seventies Japan began to ensure the access to raw materials and cheap labour outside their own country, for their expanding manufacturing sector, Japanese firms also started to look for external investment opportunities.

It cannot be denied that the interests of companies from different countries do not diverge considerably. As Evans remarked, the reason for internationalization relates above all to the possibilities for large scale capital accumulation. The way to achieve this goal, differs, however, considerably between American, European and Japanese companies. The authors belonging to the dependencia tradition did not pay much attention to these differences and their consequences for development in Third World countries. For this reason, sections 2.5. to 2.8. will deal with some authors exposing the theory of international business for whom a distinction between foreign enterprises and their way of internationalization are the central point of analysis. In section 2.6. special emphasis will be given to the Japanese author, Kojima, who defends the hypothesis that Japanese foreign investments influence development in Third World countries in a more beneficial way than American investments do.

Although some of the findings of Kojima are interesting and help to explain the role of foreign firm origin in Third World development, his analysis is limited to macro-economic factors only. Kojima did not adequately address micro-economic aspects which is one of the reasons why his theory provides an insufficient analysis of the role of foreign firms in the triple alliance concept. It is, therefore, necessary to concentrate especially on theories that examine processes of internationalization at the firm level with differences between foreign investments as their central theme.

Because the strategy of the triple alliance emphasizes the formation of business joint ventures, it is self evident that authors who analyze the creation of joint ventures, will be the focus. Authors like Beamish and Kogut, discussed in section 2.7., consider different aspects of joint ventures, such as stability of joint venture structures, dependency of joint ventures on parent companies, adaptation to the local culture and the individual corporate cultures of foreign partners in joint ventures. Other authors such as Negandhi, Nakase, Hladik and Barlett and Goshal focus on the same aspects but point more explicitly to differences between American, Japanese and European companies. Although some of these authors indeed relate the origin of a foreign enterprise to behaviour in the joint venture, they do not go a step further and relate differences to the performance of the joint venture and more indirect influence on industrial development in the host country. To obtain a clear view of the functioning of the tripartite model and the contribution of this model to the industrial development of Brazil, this relation is necessary.

Despite a number of critics[4] of the dependency school, aspects of these theories can contribute to an explanation of the role of foreign enterprises in the impressive industrialization of some Third World countries. Or, like Peter Evans remarks:

> "Whether it is used as a source of methodological orientation or of specific propositions, the work of the dependency school is an essential resource for research on the social and political impact of mnc's."[5]

Theories of imperialism which argue that the so-called center countries accumulate capital by transferring surplus from countries in the periphery to countries in the center, is the point of departure for the dependency theories. Significant political and military control exercised by the center over the periphery, is a necessary condition for capital accumulation in the center. Relations between center and periphery benefit only the center countries and limit development in the periphery.

The industrial development of some Third World countries during the fifties and sixties could not be explained by the authors of theories of Leninist imperialism, however. The national industrial growth of these peripheral countries was developed to such extent that they began to produce capital goods and more advanced durable consumer goods. Moreover, due to the increasing internationalization of production, the number of direct foreign investors increased in this period. It appeared that to a certain extent industrial development was possible in the periphery as well. Building on the theories of imperialism, several reseachers, predominantly from the Third World itself and living in Latin America, developed the so-called dependencia theories. These depedentistas, including authors such as Frank and Furtado,[6] start from the argument that underdevelopment in Third World countries is shaped by the creation of external relations between countries in the periphery and countries in the center. According to the dependencia school, center-periphery relations are incorporated in the internal class structure of the Third World country. This relation is asymmetrical because economic instability in the center countries has severe implications for the periphery while a crisis in the periphery will leave the center countries untouched.[7] In addition, the means of production in the peripheral countries are owned by representatives of the center countries. As a result, the control of capital accumulation is largely influenced by center countries.

According to the dependency school, national industrial development in peripheral countries is limited in several ways. In the first place the specific character of the industrialization, which is the result of asymmetrical relations between center and periphery, can be seen as a limitation. Industrialization in the periphery is of 'disarticulated nature'[8] which means that companies investing in the periphery do not create multiplier effects the way they do in center countries. The forward and backward linkages[9] which in the countries of the center are the main impetus for self-generating industrialization, are lacking to some extent in the periphery. Western companies that open up subsidiaries in the periphery maintain the center of production and the control over this production in their country or origin. At the

same time, feedstock and capital goods are largely imported from these Western countries and, if the market is located in the industrialized world as well, the end products and intermediary products are exported from the periphery to the center. In this way, multiplier effects are transferred to the center where industrial growth is generated.

A consequence of the disarticulated character of peripheral industrial development is that this development benefits only a small part of the population, the dominant elite. The exclusion of the masses of the fruits of consumption is the second limitation of dependent development. The majority in this situation becomes a source of cheap labour which increases the attractiveness of the Third World country to foreign investors. Due to this exclusion, industrial development requires the support of a repressive state apparatus.

However, dependency is not a static phenomenon. Changing center/periphery relations and internal alliances contribute to a continuous change in the nature of dependency. Cardoso[10] distinguishes two different phases of dependency: the phase of classic dependency, in which dependent relations between center and periphery are based on the export of predominantly primary goods, such as agricultural products and minerals, and the phase of associated dependent development, which is characterized by simultaneous and differentiated expansion of three sectors of the economy: the national private sector, the foreign sector and the public sector.[11] According to the theory of dependent development, development in peripheral countries is not characterized by stagnation. A new theoretical framework of explaining capital accumulation and industrialization is needed.

One of the most important authors in the dependent development school is Evans. Starting from the dependent development theories, Evans tries to provide a tool of analysis for the impressive industrialization of Brazil during the seventies. He argues that industrialization can be explained by the alliances that developed between various groups of the dominant class which, despite their sometimes conflicting interests, have a common interest in local capital accumulation:

> "Dependent development is a special instance of dependency, characterized by the association or alliance of international and local capital. The state also joins the alliance as an active partner, and the resulting triple alliance is a fundamental factor in the emergence of dependent development."[12]

Some aspects of Evans' analysis contribute to a better understanding of the role of foreign firms in the industrialization of Brazil. In the next part of this chapter these aspects will be described in somewhat more detail.

2.3. The triple alliance as fundamental factor in dependent development

In those countries of the periphery in which the process of dependent development plays an important role, all three types of capital forming the triple alliance, can be found. Evans concludes that the distribution of these three types of capital over the various industrial sectors is dependent on their individual comparative advantage. While in some industrial sectors foreign capital dominates, in other sectors national private capital is more important.

2.3.1. Multinational capital

During the fifties and sixties direct foreign investments played an increasingly important role in international manufacturing. While during the colonial period foreign investments in the overseas colonies has been focussed above all on the production of primary export commodities and the stimulation of direct trade with center countries, in the period thereafter the manufacturing potential of the Third World became attractive to international investors. Especially in Latin American countries experiencing a phase of import substitution, the extensive internal market and the relatively stability of labour made the production of durable and non-durable consumer goods profitable. Because of the increasing importance of manufacturing production in the internationalization process, it became desirable to create alliances with local capital already involved to some extent in this production. As a result foreign enterprises became more assimilated into Third World countries.

Certain substantial differences between foreign capital and local private capital can be discerned. The first difference relates to capital accumulation. Multinational corporations are known for their global strategy which means that they transfer the revenues they obtain from the periphery to countries in the center. The immediate result is that internal capital accumulation in the periphery is limited. Possibilities for stimulating foreign corporations to increase their local capital accumulation are dependent on certain factors. The most important factor is the bargaining position of the peripheral country. The ability of local government to impose conditions on investments will depend on the extent to which Third World countries are found to be attractive. Countries with a substantial internal market and increasing GNP figures are in a better position to negotiate with foreign investors than countries without. The bargaining position is also improved if state-controlled resources are available in the country. It is easier for countries in possession of large oil reserves to subsidize energy and feedstock prices, which can increase their attractiveness to foreign investments.

A second characteristic differentiating foreign investments from local private investments is the access of foreign firms to technological innovations. Because the monopolistic position of transnational corporations is largely due to their technological lead, they are very reluctant to invest in the transfer of this technology.

Most R&D is carried out in Western countries and when up-to-date technology is sold to companies in peripheral countries, in most cases it is in the form of so-called 'black boxes'.[13] Expansion of production or innovation of this transferred technology is further hampered by restrictive technology contracts.

Because of these characteristics of foreign capital, the majority of foreign enterprises in the Third World are found in industrial sectors in which advanced technological processes dominate, or in industrial sectors in which the foreign companies possess a comparative advantage in commercial sense. Examples of the first are the chemical and the automobile sector and of the latter the tobacco industry.

2.3.2. Local capital

Third World countries in which foreign investments are important, have their local capital strongly attached to center economies. But despite their relations with center countries and international firms, national capital accumulation is primarily a local interest. Access to technological knowledge gives foreign companies their comparative advantage. This does not mean, however, that local firms do not possess comparative advantages which explain their presence in other industrial sectors of the economy.[14] Firstly the local industrial bourgeoisie has close relations with the state bureaucracy which gives them a political legitimacy that can result in certain advantages. Second, local firms often possess access to markets that are relatively inaccessible to foreign firms. Given these particular comparative advantages, local companies are predominantly found in industrial sectors such as shoe manufacturing, food and machinery.

2.3.3. State capital

The third pillar of the tripartite model is state capital. State capital is not linked to productive activities alone like the other two types of capital. The function of the state in a peripheral country is threefold: firstly, the state supports national industrialization by stimulating national capital accumulation, particularly with respect to foreign firms which seek global capital accumulation. In addition to this regulating role, the state also plays a more direct role in the industrialization process. State companies can participate in the productive sectors of the economy by investing in joint ventures with private capital or by creating 100% state owned companies. Access to natural resources and the possibility of carrying out large capital investments are the main comparative advantages of the state. State participation in the productive sector focusses predominantly on industrial sectors involved in the extraction and processing of mineral resources such as iron ore and petroleum. A third function of the state is directly related to the exclusion the majority of the population from the benefits of dependent development. The state has to play a

repressive role in order to guarantee internal stability which is necessary for the process of dependent development. Evans remarked in this regard:

> "Repression is especially necessary in those countries which have passed through the phase of 'easy import substitution' and are trying to push the process of dependent industrialization further. (-) In the context of dependent development the need for repression is great while the need for democracy is small."[15]

In summary, dependent development is characterized by a situation in which an alliance is formed between the three types of capital which together form the dominant class in the periphery. The form of alliance can vary from mere participation in one and the same industrial sector to the creation of joint venture structures between the various types of capital. The joint goal of capital accumulation and the united effort to politically and socially repress the majority of the population can be seen as the common interests of foreign, state and national private capital.

2.3.4. External conditions

For a successful implementation of the triple alliance strategy, certain conditions must be fulfilled. First, there is the need for a large international capital market in which an abundance of financial capital makes it possible to provide financial loans on large scale. When this condition is fulfilled, like in the case of oil dollars in the early seventies, peripheral states can chose to realize an internal growth of the capital goods industry without neglecting the internal demand for consumer goods and without relying too much on internal savings.[16] This enables the peripheral state to support the industrialization process by carrying out activities in the productive sphere and by providing subsidies and incentives. Another condition for a successful implementation of dependent development, mentioned by Evans, is the fact that:

> "Dependent development is viable only if it had support from the larger system of imperialism. The entire success of the dependent development is predicated on multinationals willing to invest, international bankers willing to extend credit, and other countries willing to consume an ever increasing volume of (-) exports."[17]

Following in the footsteps of Cardoso and Evans, several other authors investigated the triple alliance strategy in other countries. Gwynn[18] analyzed this model in various Latin American countries and came to the conclusion that, in addition to conditions mentioned by Evans, a further condition must be fulfilled before one could speak of a successful triple alliance strategy. According to Gwynn, certain factors, such as a large rich upper class or important minerals, attract foreign investors and thus facilitates the forming of alliances between state capital, national private capital and foreign capital. If the internal market of a peripheral country is too small and the country has little to offer to a potential foreign investor, a transnational corporation will not be very willing to create alliances with national capital and will prefer to act independently.

2.4. The strategy of the triple alliance in Brazil: contribution and constraints

2.4.1. Contribution of the triple alliance

Evans uses his research on the functioning of the triple alliance in the process of dependent development to explain the impressive industrial growth of Brazil in the sixties and seventies. He concludes that the triple alliance above all stimulated the substantial national capital accumulation during this period. The strategy of the triple alliance contributed in two ways to the dependent development of Brazil.

Firstly, the internal capital accumulation was to a large extent stimulated through an industrial structure including all three types of capital. The first type of capital, foreign capital, was attracted during the fifties and sixties by the large internal market of Brazil, due to the substantial demand for consumer goods. The import substitution policy of the Brazilian government, which restricted the import of products that could be produced locally, increased the number of foreign companies investing directly in the country.

The second type of capital, local industrial capital, was also an important factor in Brazil during this period. A large number of entrepreneurs in the industrial sector immigrated to Brazil in the nineteenth century. Some of these immigrants had not only managerial and technological knowledge, but also financial capital which could be used for manufacturing investments. In addition to this group of entrepreneurs, a large number of industrial entrepreneurs came from the agrarian and commercial sector and wanted to diversify their activities in the industrial sector.

State capital in Brazil, finally, gained importance in the period of the 'Estado Novo', when the state participated for the first time in production activities. During the military regime from 1964 to 1985 state enterprises, like the oil company 'Petrobras' and the siderurgical company 'Vale do Rio Doce', assumed a dominant role in industrial development. The Brazilian state also supported industrial development indirectly, for instance, by creating an intensive network of infrastructural facilities such as electricity and means of transport and by subsidizing industrial activities through development banks.

The triple alliance strategy also stimulates industrial development in Brazil with technology transfer. It was thought that the formation of alliances between companies would facilitate the transfer of technology from the foreign partner to local companies. In addition, it was assumed that foreign capital participating in direct business joint ventures would find it to their advantage to transfer up-to-date technology. State enterprises participating in tripartite joint ventures provided a further contribution to technological development with their relatively high technological level.

Despite these positive conditions for technology transfer, Evans concludes that the degree of technology transfer in Brazil was less than expected. Foreign investors, which have a monopoly position based largely on their technological lead, proved to be very reluctant to transfer all technological knowledge, nor were they very willing

to carry out R&D outside Western countries.[19]

It is important to realize, however, that dependent development is not a static phenomenon and that the balance between the three types of capital is subject to continuous change. Based on research in Brazil, Evans distinguishes two simultaneously occurring processes. First, he examines 'denationalization processes'.[20] When industrialization is based on technologically advanced, capital-intensive industrial sectors, the chance exists that the local industrial bourgeoisie will be increasingly marginalized.[21] In recent research over the role of foreign investments in Mexico, Manghalagiri[22] concludes that the Mexican strategy of the triple alliance did result in denationalization and that an autonomous development of the Mexican manufacturing sector was severely restricted by this process.

A different conclusion is reached by Gereffi[23] in his research which was also carried out in Mexico. Unlike Manghalagiri, Gereffi concentrates on one industrial sector, i. e. the pharmaceutical. He concludes that, although the policy of 'mexicanization'[24], was not as successful as the Mexican government had anticipated, it did reduce the threat of marginalization of the local industrial bourgeoisie.

The ideas of Gereffi are largely in agreement with those of Evans, who argues that denationalization does not form a threat to the process of dependent development. Although local entrepreneurs probable cannot compete with foreign companies in some industrial sectors, they reinvest their capital in other industrial sectors, decreasing the chance that they will be marginalized. Evans calls this second process of change 'differentiation'. Increasing differentiation does not necessarily mean serious limits on the survival of the strategy of triple alliance. In later publications, Evans presented the example of the micro computer industry in Brazil to demonstrate that, even in more technologically advanced industrial sectors, the local industrial bourgeoisie will not necessarily be marginalized and, when sufficiently protected by government regulations, can play an important role.[25]

2.4.2. Constraints of the strategy of the triple alliance

The remarks of Evans do not imply however that the strategy of the triple alliance does not face any difficulties. The first threat to the strategy of the triple alliance considered by Evans, is the exclusion of the majority of the population from the benefits of dependent development. Because of the alliances between the different groups of the dominant class, these groups profit most from industrial and economic growth. Apparently, the benefits are not distributed to the larger population. This excluded part of the population could threaten political stability which is necessary for a high level of accumulation. Declining accumulation figures could disturb the balance between the three partners of the alliance.[26]

A second threat, which is viewed more as an economically undesirable effect of this strategy, is the increasing gap in the Brazilian balance of trade due to the disarticulated character of industrialization in a situation of dependent development. Despite the high level of industrialization in the phase of dependent development,

the needed capital and intermediary goods cannot yet be produced in the country itself and have to be imported. Since industrial production is intended primarily for the internal market, the low export figures cannot compensate for the increased imports, resulting in a negative balance of trade.

Not only the above mentioned conflicts and difficulties restrict the functioning of the tripartite model, however. A third difficulty which threatens the strategy to fail, are the internal characteristics of individual partners. The local industrial bourgeoisie, for instance, was divided, after one part created alliances with international and state capital and alienated itself from the other part of the local bourgeoisie. This process was reinforced by government policy providing subsidies and incentives to only part of the local bourgeoisie. On the one hand, Evans considers this internal division to be a necessary condition for a successful strategy of triple alliance; on the other, he is also clearly aware of the problems provoked by this division.[27] The alienated part of the industrial bourgeoisie presents a threat to internal stability of the alliance to the point that these entrepreneurs protest against the more favourable treatment of the companies participating in the triple alliance.

The internal characteristics of the state partner can also pose a threat to the process of dependent development. A successful triple alliance strategy requires that the state partner plays an active role in manufacturing production and in alliances with foreign and national private capital. However, this role is in conflict with the function of the state, a conflict which could in the end lead to a collapse of the strategy. On the one hand, the state fulfills a productive role and, as a result is interested in a high level of national capital accumulation; on the other, it has to carry out a regulative role, which, in a society characterized by dependent development, will be largely repressive in nature. Evans remarks in this regard:

> "The contradictions of dependent development are reflected in the paradoxical nature of the dependent capitalist state. It is a nationalist state whose strategy of accumulation is conditioned by its relation to the international economy and depends in the first instance on the cooperation with the multinational corporation. It is a state whose repressive protection of the interest of the dominant class is blatant, yet is excludes most of the national bourgeoisie from political participation just as it excludes the mass of the population."[28]

2.4.3. The foreign partner, a neglected participant?

Evans points to a number of obstacles to the success of the strategy of the triple alliance. The foreign partners' responsibility for these difficulties has been, however, highly underestimated. Given the special attention paid to the foreign participants, by various publications,[29] it is somewhat surprising that little reference is made to the individual roles of foreign companies. While Evans and others refer to the internal conflicts of the state partner and consider the division of the national industrial bourgeoisie to be a threat to the triple alliance strategy, transnational investors are presented as a homogeneous group of firms interested in the common

goal of global capital accumulation. Although Evans examines the uneven investment patterns of American investors, on the one hand and European and Japanese investors, on the other,[30] he does not go a step further to analyze the significance of these differences for the role of foreign firms in the functioning of the tripartite model. In several publications Evans refers to American transnationals as 'the' foreign companies, and considers their behaviour to be representative.[31]

Evans' statement had certain validity in the period before the dependent development phase, when most foreign investments in the industrial sector were by American companies, which are fairly homogeneous. However, since the second half of the twentieth century investments from Europe and Japan have played an increasingly important role in the internationalization of production. Given the declining hegemony of American transnationals outside their own country, it is important to reconsider the strategy of the triple alliance.

It is necessary to ask whether dependent development is not influenced by the origin of the foreign partner and whether in fact American investors in Brazil do behave in the same way as European and Japanese subsidiaries. Most scholars belonging to the dependent development tradition do not attempt to answer this question. Continuous reference to one ideal type of multinational, without any distinction between foreign firms from different origin, oversimplifies the process of national capital accumulation in countries such as Brazil.

Evans uses the concept of the triple alliance to analyze dependent development on a high level of abstraction. The opportunity for a more empirical analysis of this concept appeared in the early seventies when the Brazilian government decided to adopt a triple alliance strategy in order to stimulate national growth in the petrochemical sector. From than on, the formation of tripartite joint ventures -the so-called tripartite model- became a condition for investing in the sector. Although Evans discusses the Camaçari complex in depth,[32] he does not evaluate the internal dynamics of this petrochemical complex at the firm level. As a result, he misses an opportunity to further define and verify the theory of 'dependent development' on the basis of empirical research.

For this reason, in the second part of this chapter theories explaining processes at the firm level will be examined in the expectation that they will shed more light on the impact of the triple alliance strategy on dependent development. In order to evaluate this strategy empirically, it is necessary to define the concept 'development'. For the purpose of this research, emphasis will be placed on industrial development. It is argued that industrial development is stimulated when it is based in dynamic industrial sectors, characterized by their ability to generate industrial expansion by means of more or less autonomous technological development and the possibility of vertical diversification.

The role and the functioning of multinational enterprises is explained by various economists in what can be called the theories of international business. In the past three decades these theories increased in importance in response to the internationalization of manufacturing production. The first efforts to explain internationalization are made by the more conventional economists, who start from Ricardo's international trade theory of comparative advantage, which emphasizes that industrial production must be located where relative production costs are lowest.[33] Heckschler and Ohlin are among the representatives of this conventional view.[34] They, however, neglect the role of the state in international production. This changed in the mid-seventies when Williamson explored the organization of economic activities between markets and non-market institutions such as governments. His transaction cost model focusses on the proposition that firms choose how to transact based on the priority of minimizing total production and transaction costs.[35] Advocates of these economic theories share a view that multinational enterprises are most able to efficiency organize world production.[36]

A critical appraisal of the role of multinational enterprises and their impact on nation-states is articulated by neo-conventional economists, who include the question of national benefit in their research on multinational operations. With the conventional economists they share the view that multinational enterprises are most able to further generate national development; they state, however, that global welfare is not always congruent with increasing national benefit. One of the most important representatives of this school is Raymond Vernon, who links the idea of 'product life cycle' to a geographical division of labour.[37]

Another representative of this tradition is Dunning who tries to combine questions of internationalization with concepts of monopolistic competition.[38] He pays special attention to factors of ownership, location and internalization advantages, which he believes to be decisive for activities of multinational corporations.

Neither the conventional nor the neo-conventional tradition provide sufficient explanation for the impact of foreign firm origin on dependent development. One of the limitations of these theories is that they mainly focus on macro-economic explanations of multinational production and neglect certain micro-economic aspects. This limitation can be overcome drawing on the micro-economic tradition of international business theories. In this tradition the emphasis lies on organizational factors of the firm itself in explaining the organization of international production. Examples include the behavioural model and the firm strategy model.

Hymer is one of the important authors to acknowledge the importance of micro aspects of the firm. He argues that a focus on the internal motivations of the individual firms provides a better framework for the understanding of direct foreign investment.[39] Hymer drew attention to the importance of differences between multinational enterprises. Not all internationalizing firms have the same characteristics, he stated; some firms certainly have advantages over others, such as larger

economies of scale, the ability to differentiate absolute production costs and the possession of patent rights.[40] It was Hymer who first noticed that these differences had a cultural basis. With the increasing internationalization of world production multinationals were originating from more and more countries and it was no longer possible to speak of one homogeneous group of multinationals.[41] Hymer suggested that the increasingly diverse origin of foreign companies could have -although temporarily- a positive influence on the bargaining power of host countries.[42]

2.6. Kojima's hypothesis

Researchers in the line of Hymer argue that multinational companies should not be viewed as a homogeneous group of enterprises, since they all possess various national characteristics. But because authors subscribing to theories of internationalization are above all trying to explain multinational production, they do not pay much attention to the development prospective of multinational enterprises in Third World countries, nor do they take into account the unequal development patterns that emerge worldwide as a result of international production.

Only a few authors have linked the development of less developed countries to different internationalization patterns and characteristics of foreign enterprises. One of them is Kojima who proposed an explanatory model of direct foreign investments. In his model the differences between Japanese and American direct investments and their impact on development in Third World and other host countries were emphasized. Although Kojima bases his conclusions largely on the analysis of macro-economic processes, and fails to establish a plausible micro-economic basis for this macro-economic theory,[43] his research can contribute to a better understanding of dependent development theories. Kojima' hypothesis is that Japanese foreign investments, because of their specific characteristics, are more easily incorporated into the developing economies and will have a more beneficial impact on development in Third World countries than American foreign investments. The latter do not become incorporated into the economies of these countries but maintain an isolated enclave position without having a significant beneficial impact on development.

2.6.1. Development impact of Japanese investments

Kojima distinguishes various characteristics of direct foreign investments that may influence development in Third World countries.[44] The first characteristic is the difference in geographical destination of the direct foreign investments. Kojima remarks that Japanese foreign investments focus much more on developing countries, in particular South East Asian countries, than American investments, which largely concentrate on Western countries. Two other Japanese authors, Nakase[45] and

Ogure[46] notice the same trend. In the 1980s this pattern changed slightly, however, and Latin America became an important target for increasing Japanese foreign investments.[47] As far as the industrialized part of the world is concerned, the US is the main attractor of Japanese foreign investments.

In contrast, American and European investments focus much more on Western countries. In the forties, the US started to invest in European countries, especially the UK, Canada and, to a lesser extent Latin America. After the Second World War a shift in targets of investment countries became apparent. In addition to investments in Europe, emphasis was placed on investments in Asia, resulting in a relative decline in the importance of Latin America and Canada. In overall terms the foreign direct investments of US corporations declined in comparison to European and Japanese foreign direct investments.

Though it is a bit simplifying to treat the European countries as one block because of the differences between the various countries, it is nonetheless for the purpose of this research not useful to make a distinction between them all.[48] The early investments of the United Kingdom focussed predominantly on the Commonwealth Countries as well as to the United States. After the Second World War a new target became apparent: South Africa. It was not until the 1960s, and even more in the 1970s, that British multinationals finally started to invest in European countries, continuing their investments in the US.[49] Latin America was never very important for British companies, however, in contrast to West Germany. One-fifth of West Germany's total foreign investments was in the developing world, predominantly in Brazil. At the end of the eighties, the increase in European investments, especially from West Germany and the UK, was among the most significant.[50]

The second important characteristic in Kojima's hypothesis is the difference in industrial-sector preference of the various multinational enterprises. According to Kojima multinationals from the United States tend to concentrate their foreign investments in industrial sectors in which they have the largest comparative advantage. In this way they are able to assume a monopoly position which enables them to maximize capital accumulation. Because of their relatively long history in the manufacturing industry -especially in comparison to Japanese companies- the comparative advantage of US transnationals is largely in their greater technological knowledge. Most American foreign firms, therefore, invest in the more sophisticated and technologically advanced industrial sectors, including the chemical industries, mechanical and instrumental engineering and electrical and electronic engineering. This is in contrast to Japanese foreign investments which are in the technologically less advanced industrial sectors, like metals and textiles.

Nakase makes the same observation and remarks:

> "Japan's overseas investments in manufacturing, still concentrate in mainly labour-intensive industries, or industries with standard technology, while US and West German overseas investment centers around such capital intensive or high technology industries as chemicals, automobiles and computers.(-) Japanese companies are obviously at an advantage in standardized products."[51]

Although Kojima does not include European investments in his hypothesis, different

sectoral patterns do exist and are even evident within Europe. For instance, British firms which invested predominantly in the less advanced technological sectors, resemble more the Japanese firms.[52] West German enterprises, on the other hand, are more or less comparable to US multinationals, showing preference for investing in higher-technology sectors.[53]

A third important characteristic mentioned by Kojima, is the differing size of American and Japanese overseas investments. Japanese foreign investors tend to be smaller than their American and European competitors.[54] Because of their smaller size, Japanese enterprises more easily connect with the economic sector of the Third World country whereas the multiplier effects of the American giants are minimal. Nakase added that the importance of small and medium-sized enterprises in the overseas expansion of Japanese capital was largely influenced by the organizational structure of foreign investments. Only a few of these small and medium-sized enterprises are 'independent' investments; most of them are organized by the so-called 'sogo shosha'.[55] Because of their extended trading experience overseas, the 'sogo shosha' were quite familiar with local cultural habits, the language and management style of enterprises in host countries and they were able to act as an intermediary between the Japanese firm on the one hand and local private companies, state companies and foreign governments, on the other.

2.6.2. The role of technology transfer

An important aspect of direct foreign investments in developing countries, -also emphasized in dependent development theories- is technology transfer from foreign to local firms. Evans starts from the view that the transfer of technology is stimulated by dependent development, although on a limited scale. However, he does not make any distinction between foreign firms from different countries in regard to technology transfer. Kojima also considers technology transfer to be a crucial factor in the growth of manufacturing in developing countries. He is of the opinion that governments of developing host countries have to be aware of the importance of technology and carefully choose the type of foreign investment that will provide the best opportunities for technology transfer. At the same time he admits that host countries express considerably more interest in technology transfer than foreign firms. On the one hand, foreign firms are not very willing to transfer their technology with the risk of losing their comparative advantage. On the other hand, developing countries seek full technology transfer, in order to diminish their dependency on Western countries.[56]

Before proceeding further it is necessary to more closely examine the concept of 'transfer of technology'; which is a vague description of a rather complex phenomenon. In the first place the concept 'technology' is very broad, applying to the more technical processes, embedded in the production machinery, as well as more indirect technology like management skills and knowledge of market relations. In this book, 'technology transfer' refers explicitly to the more technical processes. In a technical

sense it is necessary to make a distinction between different aspects of technology transfer. When a company acquires new technology, either purchased from a technology supplier, or obtained from a participating (foreign) firm, it has to absorb and master this technology, adapting it to its needs. Once the new technology is absorbed, the technology needs to be 'debottlenecked' in order to improve production. This implies that all initial difficulties need to be overcome and minor technological improvements, necessary for adjusting to local circumstances, need to be made. The final phase involves innovating the production process with the absorbed and debottlenecked technology. In this phase the company needs to carry out its own R&D in order to keep up with the rapidly changing technological development on a world scale.

The concept technology transfer plays an important role in Kojima's hypothesis. Kojima distinguishes two types of technology transfer: the orderly transfer of technology which he characterizes as the Japanese type, and technology transfer in reverse order, the American type.[57] American foreign investments, he argues, can mainly be found in technologically advanced industrial sectors, which are highly innovative and strongly oligopolistic in character. The American comparative advantage is largely in the generation of innovations, rather than the more conventional notion of relatively cheap capital goods. As a consequence, the transfer of technology from American firms is limited because the larger the technology gap, the more difficult the transfer of technology will be.[58]

The American form of direct foreign investment is not beneficial to the receiving developing country: enclaves of technologically advanced production generate few linkages with the more traditional industries and the industrial development of the host country is not stimulated. Kojima is much more a supporter of the Japanese type of foreign direct investment and technology transfer which, in his view, is closer to the technology of developing countries and, therefore, more easily transferable.[59] The orderly transfer of technology does, however, keep the host country at a lower and inferior stage of industrialization relative to the investing country. But, according to Kojima, the benefits for the developing country are larger than the costs.[60]

In addition to Kojima several other researchers have analyzed the implications of technology transfer for developing countries. One of them is Dunning, who bases his conclusions on a comparative analysis of Japanese and American foreign investments in a Western country -the United Kingdom- and comes to slightly different conclusions than Kojima.[61] Dunning agrees with Kojima that Japanese and American investments are different. The main difference he notices is that US investments focus on the innovating capacities of the companies while Japanese investments put more emphasis on quality control, product differentiation, cost advantages, and good industrial relations.[62] In contrast to Kojima, Dunning does not notice more technology transfer from Japanese foreign firms. Instead he remarks that they do not invest as much on R&D as their American competitors. Of course, it is possible that the lack of similarity in the findings stems from the fact that Dunning

conducts his research in a Western country while the conclusions of Kojima are largely based on developing countries.

But local R&D is only one way of stimulating the local development of technology; training of local engineers is another. With respect to this subject, different opinions can be found in the literature. Kojima has a clear position on the relationship between foreign firm origin and the degree of training local engineers receive. In his view, the Japanese type of foreign investments logically results in more training possibilities for local engineers since it involves more person-to-person contact, from management down to routine operations.[63] Nakase, on the other hand, came to the conclusion that Japanese foreign enterprises are not very interested in the training of local staff.[64]

Another author who did not agree with Kojima is Taddesse[65]. In his research on Japanese joint ventures in the Asean countries, Taddesse points to the restrictive technology contracts, as well as some positive aspects for developing countries of Japanese technology transfer. He sees a two fold strategy of technology transfer from Japanese firms:

> "The transfer of old techniques of declining importance in Japan, to the neighbouring east Asian countries, producing standardized and conventional products such as textiles and plywood, and a R&D based high technology in the sectors of electronics, chemicals and petrochemicals, to the advanced countries."[66]

According to Taddesse, the technology sold by Japanese firms was much cheaper than the technology sold by American firms. The standardized nature of the technology and the fact that it was sold at cheaper prices did not mean, however, that technology transfer from Japanese firms was better arranged than from American firms. In addition, Japanese technology contracts proved to be very restrictive.[67] The hypothesis of Kojima is not undisputed and several authors have come to different conclusions. It is worthwhile to consider these critical comments in somewhat more detail.

2.6.3. Some critical comments on Kojima

Summarized briefly, the hypothesis of Kojima makes a distinction between, on the one hand, the more traditional Japanese investments, carried out by small and medium-sized firms, in industrial sectors favouring the developing country, which are more easily incorporated into developing countries and, on the other, large American investments in sophisticated industrial sectors, which they monopolize and which remain isolated phenomena, more difficult to incorporate.[68]

Most of the authors who criticize Kojima emphasize the fact that he largely ignores the dynamic aspects. Kojima bases his conclusions on a static situation in which he compares recently internationalized Japanese multinationals with American multinationals which possess a much longer history of international production. Dunning remarks with respect to the ideas of Kojima:

"Empirically, the alleged dichotomy between the patterns of Japanese and US direct investment is a false one. (-) Such differences as do exist reflect the different stages in the evolution of Japanese and American MNEs as much as anything else."[69]

Sekiguchi and Krause[70] also question the results of Kojima's research. They compare American and Japanese foreign investments in the Asean countries, and criticize Kojima's claim that there is a difference in the impact of Japanese and American multinationals on development:

"The welfare approach of the Kojima hypothesis is not persuasive and probably wrong. (-) It is essentially a partial and static analysis that does not fit the dynamics of direct investments. Our belief is that the classical analysis is correct and that all direct investment improves welfare unless determined by government or private distortions. In particular Kojima may exaggerate the welfare benefits of Japanese investments and certainly underestimates welfare gains of American investments."[71]

Findly, while emphasizing the importance of Kojima's results for further research, also suggests that Kojima's hypothesis is based on false assumptions and will have only temporary validity. Once Japan graduates from the rank of investor in relatively low-wage countries, the suggested benefits of Japanese foreign investments will probably be a thing of the past.[72] In other words, it is doubtful that Japanese firms will continue to concentrate their investments in lower income countries if they have more opportunities to invest in Western countries. The figures from the United Nations Report on transnational corporations demonstrate that Findley's prediction has already became true:

"The share of developing countries in Japanese FDI declined from 57 per cent in 1975 to 33 per cent in 1986".[73]

The focus of Kojima, and with him several other researchers like Sekiguchi and Krause, on Japanese foreign investments in South East Asian countries, despite the increasing importance of Latin American countries, may also result in biased conclusions. Finally, the preference of Japanese companies for investing abroad in more traditional industrial sectors was beyond dispute in the seventies. In that decade, Japanese companies investing abroad either did not possess the most recent technologies, or were not willing to transfer these technologies to overseas subsidiaries, beyond their control. It is questionable whether this is still the practice today.

Despite the absence of dynamic aspects in Kojima's hypothesis, his analysis provides an interesting starting point for considering how differences between foreign investors in developing countries influence the strategy of the triple alliance and the process of dependent development.

Kojima is clear in that foreign investments are not homogeneous and that a difference need to be made between the US type of investments and the Japanese type of investments. In order to make the link between the dependent development theory and theories of international business, it is necessary to examine the formation of alliances on firm level. Is it possible that foreign companies origin relates to the ability to form and maintain alliances? To answer this question it is necessary to correlate the formation of alliances or joint ventures with development of Third World countries. One of the authors that makes this connection is Beamish (1988) who analyses the impact of joint ventures on development in Third World countries. According to Beamish, theories of international business have neglected the importance of joint venture structures. This is a serious shortcoming since, in the last decades, joint ventures have become increasingly important in world production, especially in Third World countries.[74] Beamish considers investments in the form of joint ventures much more beneficial for development than 100% ownership investments because joint ventures can act as agents for the transfer of technology.[75] Taddesse provides a clear definition of joint venture structures:

> "A joint venture is a separately incorporated enterprise in which investors from two or more countries commit capital assets, share some degree of management responsibility at some level and participate jointly with full risks of the enterprise and when possible neither party receives benefits from the enterprise other than through a share of net earning".[76]

2.7.1. Motivations for starting joint ventures

To understand the impact of joint venture ownership on the firm performance of subsidiaries in Third World countries, it is important to consider the motives for entering into a joint venture. Kogut[77] distinguishes different firm motives for deciding to share ownership. First, he argues, economic motives are responsible for the decision to form a joint venture. Companies want to minimize production costs and will only enter into a joint venture structure if the production costs, as a result, will be reduced.[78]

Strategic motives are the second factor mentioned by Kogut. By entering into a joint venture, a company tries to improve its competitive position in comparison to other companies in the same branch.[79] Third is an organizational motive: the desire to obtain what he calls 'tacit knowledge', i.e. knowledge that is organizationally embedded and only transferable through joint venture structures, stimulates enterprises to share ownership.[80]

Kogut's analysis is based on joint venture structures of a general nature and does not distinguish different types of joint ventures such as those between two Western companies, and between Western companies and local Third World firms, i.e. the

so-called foreign/local joint ventures.[81] In contrast, Beamish, who concentrates on foreign/local joint ventures, mentions five 'needs' which provide an incentive for entering a joint venture. Of these five needs, the first three correspond more or less to the economic motives identified by Kogut. In the first place, the need for what he called 'items readily capitalized' can be a motive for sharing ownership. These items consist, for example, of raw materials that are otherwise not available, special technologies or equipment. A second need is the availability of human resources, or access to a low-cost labour force and the third is access to the market. The fourth need, probably of more importance in developing countries than in Western countries, is the government/political need. Firms that would otherwise prefer 100% ownership, decide to enter into a joint venture because they are induced by certain government regulations.[82] Finally, the fifth need Beamish mentions, the need for knowledge, corresponds with the final motive of Kogut. But, unlike Kogut, Beamish refers with this motive to external knowledge of society more than to knowledge embedded in the company itself. General knowledge of the local economy, customs and policies are important for a foreign company investing in a developing country.[83]

2.7.2. Impact of origin on joint venture participation

Various reasons for deciding to enter into a joint venture have been mentioned. The remarks of Kojima, Dunning and others suggest that foreign firms originating from different countries do not necessarily behave in the same way. A further question is whether cultural differences between the various foreign investors influence the motives of these firms for starting a joint venture. Kogut hypothesizes that:

> "Entry (into joint ventures) could be influenced by cultural characteristics of a firms's country of origin".[84]

According to Kogut, American firms, in contrast to European firms, have a negative attitude towards participating in joint ventures. The reluctant attitude of American companies is well known among researchers who analyze joint venture patterns. In research about the attitude of British multinationals, Jones[85] remarks that non-American multinationals were much more willing to have a local partner or to admit local equity participation than American companies. Hladik[86], who investigated joint venture patterns between American and non-American companies, also points to the preference of US multinationals for majority ownership.

If Japanese companies are compared with American transnationals, some authors notice a different attitude about entering into joint ventures. Kojima considers cultural differences to be a decisive factor in the willingness of Japanese firms to enter into joint ventures and he relates these differences to the motives for internationalizing. According to Kojima, a foreign company prefers direct foreign investments so that it can have a strong influence on the ownership pattern of its venture. Kojima distinguishes three different motives for direct foreign investments: natural resource-oriented foreign investment, labour-oriented investment and market-

oriented investment. He relates these different motives to the origin of the foreign firm and identifies a clear difference between the motives of American firms and Japanese firms for internationalizing. American firms, he states, invest abroad as part of a global strategy in order to maximize monopolistic or oligopolistic profits. Therefore, they prefer complete ownership of subsidiaries so that they can protect their technological monopoly with patents and prevent technology transfer and spread effects.[87] The market-oriented motive of American foreign investments contrasts strongly with the resource-oriented and labour-oriented motive of Japanese foreign investments. According to Kojima, Japanese companies started to invest abroad because of a shortage of natural resources in Japan and the relatively high labour costs in their country. Due to these different interests, Japanese companies show a much more positive attitude toward entering into joint ventures than American companies. Another researcher who compares the internal decisionmaking processes of Japanese, American and German companies is Negandhi[88]. Based on his survey of 158 subsidiaries in countries all over the world, he concludes that Japanese companies in general demonstrate greater willingness to share ownership. In Kojima 's footsteps, Sekiguchi and Krause link the different motives of Japanese and American firms for internationalizing to attitude about entering into joint venture structures. They add, however, an additional motive, not mentioned by Kojima, namely the greater responsiveness of Japanese firms to government incentives in host countries or in their own country, which also contributes to the larger number of Japanese joint ventures relative to American-shared companies.[89] Taddesse also points to the latter motive as a decisive factor for Japanese multinationals entering joint ventures:

> "In view of the constraint in the foreign exchange position and anxious to minimize the Japanese investors' risks, the (Japanese) government decided to encourage joint venture type of investment when approving case by case Japanese investors' request for foreign exchange permits.[90]

However, the above-mentioned differences between Japanese and American companies suggest a very static view of the attitude of foreign enterprises towards shared ownership. Only Jones, who studied British foreign firms, notices that attitudes towards participating in joint ventures are subject to change over time. He discovers a declining willingness on the part of British transnational corporations to form joint ventures which he explains as due to the increasing confidence of these international corporations and their increasing knowledge of international markets.[91] It would be interesting to examine whether the changing attitude of British firms applies to other foreign companies as well.

2.8. Stability of joint ventures

The performance of the foreign/local joint ventures and the stability of these ownership structures is significant for industrial development. According to Beamish, joint ventures in developing countries are very unstable and frequently -much more than in developed countries- end in failures. The stability of joint ventures is decisive for developing countries. Stable joint venture structures can form an important stimulus for development whereas unstable joint ventures can hinder future industrialization in a Third World country.[92] Several factors influence the stability of a foreign/local joint venture. The first factor, which will be considered in the next section, is the participation of state companies in joint ventures. Other important factors include the autonomy of the subsidiary, adaptation to local circumstances and corporate culture.

2.8.1. Different attitudes toward state participation

According to Beamish, state involvement in a joint venture may have a disruptive effect. Joint ventures with government partners are characterized by a high degree of instability.[93] For the present research which focusses on the strategy of triple alliance joint ventures involving one government partner, this statement is of great importance. If Beamish is correct, tripé joint ventures are not the most stable ownership structures. Although tripé joint ventures are not included in his research, Beamish' conclusions about government participation in joint ventures are worth mentioning:

> "Most of the time the foreign partners are not very satisfied with the performance of the JV when government partners are participating. MNE executives favour forming JV with local private firms, over all other forms of foreign equity-investment."[94]

It is doubtful, however, that this attitude will be the same for all foreign enterprises, as Beamish seems to assume. One can question whether the stability of a joint venture structure will be influenced by the attitude of the foreign participant towards state participation. Various authors who analyzed the relationship between multinationals and state companies are quite unanimous in their opinion that in general Japanese companies have a much more positive attitude towards state intervention and participation of state firms in productive sectors than their American and European competitors. In part this difference in attitude can be ascribed to the close link between the state and the 'sogo shosha', which were Japan's pioneering companies in the area of foreign investments. In the overseas expansion of Japanese manufacturing, maximum use was made of state capital, due to the large overall involvement of the state in the Japanese economy.[95] Dicken[96] points to the Japanese historical tradition in which the Japanese government is given a legitimate role in shaping industrial policy. In his view, Japanese businessmen

expect government intervention to stimulate industrialization. In comparison to Japan, European countries and the United States have experienced minimal government intervention in economic activities. Although the phenomenon of 'state enterprise', is almost absent in the Japanese world[97] unlike in European countries, the role of the state in the economy in Europe and the United States is relatively small compared to Japan.

It is not exactly clear how this different attitude towards state intervention and direct state participation effects the willingness of foreign firms to enter into joint ventures with state enterprises and the stability of the joint venture structure. Hladik identifies a difference between US and European multinationals with respect to state participation:

> "US firms tended to view such arrangements with a great deal of suspicion. Unlike European firms, US firms were inclined to reject any such associations as inherently evil, as a token of socialization and unacceptable to a free enterprise economy."[98]

2.8.2. Control over the joint venture

The success or failure of a local/foreign joint venture is influenced by the degree to which the foreign subsidiary is tied to its parent company. Beamish argues that the autonomy of a joint venture is decisive for its performance and that autonomously managed ventures had much more positive growth figures than dependent companies.[99] He also notices a negative correlation between dominant foreign control and the performance of a company.[100] According to Kogut one of the most important sources of instability, often resulting in termination of the joint venture, is conflict between the foreign parent and the joint venture. These conflicts increase with the degree of coordination desired by the parents.[101]

A more autonomous position for the joint venture is, however, not a sufficient condition for success. The way in which the shares are divided between the various partners is also of importance. Beamish found that shared ownership structures with a 50/50 division never worked out very well. The decisionmaking process in the company was severely strained by the equal sharing of power. He found instead that joint ventures performed better when the foreign partner possessed minority shares.[102]

With respect to the impact of autonomy on joint venture performance, no distinction has been made on the basis of foreign firm origin. Nevertheless, some authors point to a correlation between the autonomy of subsidiaries and origin of the company. Negandhi found that American subsidiaries have the least autonomy, the Japanese the most and the German subsidiaries are somewhere in the middle.[103] Japanese companies rely much more on informal networks between parents and subsidiary while European and American firms make use of formalized reporting, tying their subsidiaries more closely to the parent. In contrast, Dunning found a large degree of autonomy in American companies.[104] Two other authors who

disagree with the conclusions of Negandhi are Barlett and Ghoshal.[105] These two researchers, who analyzed the possibilities of improving management practices in global companies, made a clear distinction between the organizational structures of Japanese, American and European international companies. They found that Japanese multinationals are characterized by a highly centralized organization which ties the subsidiaries closely to the parent companies. American companies instead rely on professional overseas managers, who have a certain degree of autonomy but are still controlled by the US parent. For European multinationals, which originated in closely related family conglomerates, informal management practices are very important. In many cases managers of European firms who are sent overseas are family members or close friends of the family. A high degree of autonomy and responsibility for production is delegated to them.[106]

Taddesse argues that, despite the minority shares often held by Japanese foreign firms, the level of control they execute is rather high. Japanese companies have other mechanisms for influencing firm decisions of the joint ventures in which they participate. One mechanism for maintaining control is to arrange a high debt equity rate for the company. Another method is to appoint a large number of Japanese expatriates to vital positions.[107]

Barlett and Ghoshal also discuss the use of expatriate managers[108] by the various multinational corporations. The degree to which a subsidiary is tied to its parent company can be influenced by the number and experience of expatriates that work in the company. The number of expatriates is dependent on various factors. The first factor is the expense: given the large costs of maintaining expatriates in foreign countries, many foreign companies try to minimize the use of foreign managers.[109] Especially larger foreign firms can afford to employ expatriates. Secondly, the control factor provides an incentive for the use of expatriates. Most foreign firms do not like the idea that a subsidiary is producing beyond the reach of their tight control.[110] A third factor -which also encourages the use of expatriates- is the lack of experienced managers in the host country. In developing countries, this factor is of particular importance.[111]

The frequency with which expatriates are used and their number may also vary by origin of the country. Most authors dealing with the issue, share the opinion that Japanese companies make relatively more use of expatriates than European and American firms. Dunning states:

> "Whereas the chief executive of 30% of the US subsidiaries in the 1950 was an US expatriate, the corresponding figure for Japanese subsidiaries in the mid 1980s was 85%."[112]

Sekiguchi and Krause also emphasize the concentration of decisionmaking in the hands of a relatively large staff of Japanese managers.[113] Barlett and Ghoshal conclude that European companies make much more use of local managers who have a relatively large degree of responsibility.[114]

Three reasons explain the large number of Japanese managers. Firstly, there is the ownership structure of the companies. According to Nakase, the absolute control by American parent companies is ensured by a pattern of exclusive ownership over

subsidiaries. By contrast, the Japanese subsidiaries are often only partly owned by the parent company which makes it necessary to place Japanese personnel in various important positions in the subsidiary organization.[115] Secondly language and cultural differences in part explain the large number of Japanese expatriates. For effective communication -and control- between subsidiary and parent company knowledge of each other's languages is essential. Japanese executives, however, have significant difficulties learning foreign languages, compared to their American or European colleagues.[116] Thirdly the centralized organizational structure of Japanese multinationals provide an explanation. Because all firm decisions need to be taken in the headquarters of the company, expatriates form an indispensable link between subsidiary and parent.[117] Kojima and Negandhi argue that too much dependence of the foreign/local joint venture on its foreign parent company leads to negative performance by the joint venture. According to Kojima, the large number of Japanese expatriates is not positive:

> "Behaviour of the foreign firms and their staff are condemned from various points of view: too many Japanese expatriates are present; they herd together and do not mingle with the local people; they look forward only to returning to the parent company headquarters; local staff are not properly promoted or not used in important decision making."[118]

He concludes that much dependence of the subsidiary on the parent company may eventually result in failure of the joint venture. This conclusion is supported by Negandhi who states that a subsidiary with a high degree of autonomy is better accepted by the host country because of the improved growth and survival potential of the company.[119]

2.8.3. Adaptation to local circumstances

The stability and performance of a foreign/local joint venture is determined by the ability of the foreign partner to adapt to the culture of the host country. Adaptation is seen as a way to reduce or stabilize conflicts between joint venture partners.[120] The ability and willingness of a foreign firm to comply with local circumstances in the host country can be a decisive factor in the success or failure of a joint venture, especially if the local situation does not resemble that of the country where the parent company is located. Joint ventures in developing countries in particular, where cultural values differ most from Western countries, are vulnerable to failures caused by different cultural values.

A number of authors comment on the ability of American, Japanese and European enterprises to adapt to local cultures. Nakase, for example, observes that Japanese firms had some difficulties adjusting to a completely different cultural situation. Racial discrimination against local people and a lack of understanding of the local culture, manners, customs, religion, language and the situation of labour unions was more characteristic of Japanese subsidiaries. Barlett and Ghoshal also notice cultural barriers to the integration of Japanese multinationals in a non-Japanese environ-

ment.[121] This is in sharp contrast to European and American companies, which, because of their long tradition of overseas involvement, show a much more cooperative attitude towards local social and cultural circumstances.[122]

Dunning argues that American firms had more difficulty adjusting to the treatment of local employees. American subsidiaries have a very aggressive style of labour recruitment and are willing to pay well above the local average wage to attract the right kind of labour. This contrasts with Japanese affiliates which are highly sensitive to local criticism of their labour policies.[123] There is no agreement about the differing ability of foreign enterprises to adapt to foreign countries. Even less can be said about the impact of differences in adaptation on the success or failure of joint ventures in these countries.

2.8.4. Corporate culture

Finally, the corporate culture of participating firms is important for the performance of foreign/local joint venture structures.[124] The success of a joint venture requires that the corporate culture of the foreign firm is connected to the corporate culture of the local firm in the host country. There are noteworthy differences in the corporate cultures of Japanese companies, on the one hand, and European and American companies, on the other. The unique 'Japanese management style' is mentioned in several publications. Nakase writes for example, about the 'Japanese style of management' which consists of 'senior group loyalty' and 'the collective responsibility system.'[125]

What distinguishes the management style of Japanese from American and European firms? Dunning tries to explain the dominance of Japanese management style in many joint venture firms:

> "In general, Japanese affiliates in the 1980s would seem to exercise closer influence and control over general management philosophy and style than did their US counterparts in the 1950s. This is partly a function of the type of activity, pattern of ownership and age of the affiliate, but, perhaps more significantly, the more holistic approach adopted by the Japanese to decision making. The attention paid to encouraging the right work ethic, group behaviour and team support, requires an integrated organizational policy, the control and monitoring of which must be centralized."[126]

In a guide for entrepreneurs who wish to start joint ventures with Japanese entrepreneurs, Rowland[127] stresses the holistic approach and the group behaviour of Japanese managers. Decisions in Japan are never personal decisions; a consensus always has to be reached within a large group of participants. Responsibilities must be shared and decisions must be unanimous. Rowland compares the group behaviour of Japanese managers with the more individualistic style of Western decisionmaking and concludes that in the West, more prestige is attached to individual desicionmaking, while in Japan such individualistic behaviour would be 'punished' by the larger group. The different corporate culture of Japanese com-

panies can create some problems in foreign/local joint ventures when two or more kinds of firm management need to be combined.

Negandhi, finally, draws attention to the fact that these phenomenon are dynamic factors which are subject to change. He found that, due to the negative impact of the Japanese management style on foreign investments, the Japanese learned to restrict the use of this particular characteristic of their corporate culture in order to avoid conflicts.[128]

2.9. Purpose of this research

Evans' use of the theory of dependent development and the concept of the tripartite alliance has contributed to a better understanding of the impressive industrial development of Brazil during the seventies. There are some weaknesses in his research, however, especially with respect to the role of the foreign partner in the triple alliance. Evans bases his conclusions in part on the assumption that all foreign enterprises have the common goal of global capital accumulation. The fact that the different foreign partners exhibit a different behaviour, which can possibly influence the functioning of triple alliances, is, however, neglected. It is, therefore, worthwhile to examine the research of Evans in light of the differences between foreign enterprises as expressed in theories of international business.

To facilitate a comparison between the findings of Evans and the findings of this research, I chose to conduct research on the firm level in the same country and the same industrial sector i.e. the petrochemical sector of Brazil, with special emphasis on one petrochemical complex, the complex of Camaçari. This petrochemical complex is the most important in Brazil, in economic as well as in political sense, and was the main example analyzed by Evans.[129]

2.9.1. Research objective and research questions

This research starts from the theoretical assumptions of Evans in order to compare his findings with those of theorists of international business, such as Kojima and Dunning. A second purpose is to evaluate the effectiveness of the triple alliance model as used by the Brazilian government for development and to stimulate the national petrochemical industry. The objective of this research can be summarized as follows:

> "To analyze the contribution of the constellation of the triple alliance to the development of the petrochemical industry of Brazil in general and the petrochemical complex of Camaçari in particular in the previous fifteen years with special emphasis on the implications of the origin of the foreign partner."

The following research questions are dealt with:
1. What has been the contribution of the state, the national private bourgeoisie and the multinational corporation, in short all participants of the triple alliance, to the development of the petrochemical industry in Brazil since the 1950s?
2. What is the contribution of the triple alliance to the development of the petrochemical complex of Camaçari and which changes can be noticed in the respective roles of the three partners in the ten years the complex has functioned (1979-1989)?
3. To what extent have the objectives of the Brazilian government with respect to the implementation of the Camaçari petrochemical complex been accomplished?
4. What has the contribution of the foreign partner in the Camaçari complex been with respect to participation in tripartite joint ventures and transfer of technology?
5. Is it possible to discern differences between American, European and Japanese foreign investors in the Camaçari petrochemical complex with respect to participation in tripartite joint ventures and transfer of technology?
6. If differences can be discerned, what are the implications of these differences for the functioning of the triple alliance model in the petrochemical complex of Camaçari?

2.9.2. Research methods

To answer these research questions, the following research methods were used. Firstly, secondary sources were examined at University libraries in the Netherlands, as well as libraries from other institutes like the library of the Economic Information Service of the Ministry of Foreign Affairs and the documentation of the Dutch research institutes 'Stichting Onderzoek Multinationale Ondernemingen' (SOMO) and 'Onderzoeksgroep Multinationale Ondernemingen Latijns Amerika' (MOL).

Field work was carried out in Brazil, periods of three months and of five months in 1988 and 1989 respectively. Several institutes in Rio de Janeiro were visited to collect secondary data.[130] In São Paulo, useful secondary data was found in the Roberto Simonson library and the library of DIEESE and, in the capital Brasilia, the Congress library and the libraries of the Banco do Brasil and the Secretary of Industrial Development (SDI) provided useful articles and statistics. Furthermore, many newspaper clippings from the Gazeta Mercantil and Folha de São Paulo, in particular, were used.

Secondly, in-depth interviews and questionnaires were conducted. To obtain more insight into recent developments of the petrochemical industry and to compare different opinions, a total of 99 in-depth interviews were held with key informants. In the first place, these key informants represented the three kinds of enterprises participating in the triple alliance of the petrochemical industry. Nineteen representatives of the state enterprises Petroquisa, Petrobras and the 'Banco Nacional de Desenvolvimento Economico e Social' (BNDES) were interviewed as well as representatives of the seven most important national private petrochemical firms. Of the foreign petrochemical enterprises, representatives of four American, eight

European as well as six Japanese companies contributed to the collection of data. In most cases, the president director or one of the other presented directors participated in the interviews which took approximately between 1 and 2 hours. Furthermore, the opinions of the state bureaucracy were obtained from representatives of relevant Ministries and government institutes such as the Ministry of Science and Technology, the Department of Industrial Technology and the SDI. Finally, informants of other relevant institutes were interviewed.[131]

All executive managers of the chemical firms located on the complex were asked for an interview involving a formal questionnaire. From a total number of 44 operating firms there was a very high response rate- only one firm refused to participate- and a total of 43 questionnaires were completed. In 29 cases the General Manager answered the questions, in 14 cases one of the other executive managers. In general the questionnaire took 2 to 2 hour to complete.

Since the collection of data ended in October 1989, the analysis in this research will be limited to this period only. Neither the government policy of President Fernando Collor de Mello nor his new stabilization programme, nor the influence of the Golf crisis which influences the petrochemical industry, will be taken into consideration.

2.10. Summary and conclusions

The role of multinational enterprises in the industrial development process of Third World countries has been researched by dependent development authors. The research carried out by Evans in Brazil provides a good understanding of the reason why some Third World countries managed to achieve impressive industrial growth while others only stagnate. According to Evans, the constellation in which state capital, national private capital and foreign capital played complementary roles -the so-called triple alliance- was a decisive factor in the explanation of the Brazilian economic miracle.

However, Evans notices some potential threats to the stability of the model which could hamper further national capital accumulation and industrial development in the Third World country. Only a part of the private national companies was able to form alliances with international capital. The exclusion of the other part of the national industrial bourgeoisie could be a potential source of conflicts. Also the conflicting roles of the state partner, which acts simultaneously as a productive entrepreneur, a regulating state institution and a repressive apparatus, could cause the triple alliance to fail.

Although Evans pays a great deal of attention to the role of the foreign partner in the triple alliance, he fails to distinguish any difference between companies originating from different countries. In his view the multinational companies participating in the triple alliance have one common purpose -the global accumula-

tion of capital. It is questionable whether this assumption still holds true in an increasingly globalized economy.

Since other authors from the dependent development tradition have not answered this question either, theories of international business were examined. Kojima, for instance, distinguishes clear differences between American and Japanese companies, and relates these differences to industrial development in Third World countries. Drawing predominantly on macro-economic assumptions, Kojima concludes that the influence of Japanese companies on industrial development in Third World countries is much more positive than that of American companies. Japanese companies not only direct a larger part of their foreign investments to developing countries; their foreign subsidiaries also tend to be smaller and invest in more traditional industrial sectors, more compatible with existing industries in the host country. According to Kojima, Japanese companies are generally more willing to transfer technology. The lack of attention to dynamic aspects in his analysis and failure to identify the different phases of industrialization of Japanese and American multinationals are serious shortcomings. Nevertheless, his hypothesis provides a valuable contribution to understanding the role of foreign enterprises in the industrial development of Third World countries.

Because the purpose of this research is to obtain a better understanding of the functioning of the triple alliance model, it is necessary to consider the relations of foreign capital with private national or state capital. Since these relations are the most clear cut in the so-called joint venture structures, literature relating to joint ventures was consulted. Several authors examined cultural differences between American, European and Japanese multinationals and their attitude towards joint ventures.

Most authors referred to in this chapter agree with the proposition that Japanese companies are more willing to participate in joint venture structures than American companies. Their more positive attitude towards joint ventures could result in more stable joint ventures. Several other factors influence the stability of the joint venture as well. In the first place the influence of state partners is thought to be negative. It is unclear whether the more positive attitude of Japanese companies towards state involvement results in more stable joint ventures. The autonomy of the subsidiary versus control of the parent company, is another factor influencing the stability of the joint venture. While Negandhi stresses the autonomous character of the Japanese subsidiaries, Barlett and Ghoshal come to slightly different conclusions. Japanese companies have a highly centralized organizational structure which ties the subsidiary closely to the parent company. Also, there was no agreement in the literature about differences in the ability to adapt to local circumstances, the third factor influencing the stability of the joint venture. While Nakase stresses the difficulties Japanese companies have adapting to local habits, Dunning emphasizes the problem of American companies, especially with respect to treatment of local employees.

A final factor in the stability of joint ventures is the corporate culture. The very specific corporate culture of Japanese companies can present some problems when two different companies are combined in a joint venture. American and European

companies seem to possess a corporate culture that is less particular and more easily combined with other firms.

Although many differences can be distinguished between American, European and Japanese foreign companies, a clear understanding of the influence of these differences on the performance and stability of joint ventures in developing countries cannot be distilled. Furthermore, little reference has been made to the role these differences play in the functioning of the triple alliance constellation. The purpose of this book is, therefore, to elaborate on the correlation of attitudes of multinational enterprises from different origins and the functioning of the triple alliance model in the petrochemical industry in Brazil.

Notes chapter two

1. Evans, P., Dependent development, the alliance of multinational, state and local capital in Brazil, Princeton University Press, New Yersey, 1979.
2. Gereffi, G. and Evans, P., Transnational corporations, dependent development and state policy in the semi periphery: a comparison of Brazil and Mexico, in: Latin American Research Review, vol XVI, no 3, 1981, p 47, Mangalagiri, 1989, p 2.
3. Gwynn, R. N., Multinational corporations and the triple alliance in Latin America, in: Dixon, E. J., Drakakis-Smit, D., Watts, H., ed. Multinational corporations and the Third World, Croom Helm, London, 1986, p 128.
4. See for example Booth, D. Marxism and development sociology: interpreting the impasse, in: World Development, vol. 13, nr. 7, July 1985.
5. Evans, P., recent research on multinational corporations, in: Annual Reviews of Sociology, 1981, (199-223), p 202.
6. Frank, André Gunder, Lumpenburgesia: Lumpendesarollo, Ediciones de la Banda Oriental, Montevideo, Uruguay, 1975; Furtado, C. Rescuing Brazil, reversion recession, in: Tird World Quarterly nr. 6, July, (604-623), 1984.
7. Evans, P., 1979, p 26.
8. Peripheral economies are disarticulated when the firms in these countries are not connected to each other in the same way as firms in an autocentric economy. Evans, P., 1979, p 28.
9. By forward and backward linkages are meant inter-firm relations between companies, on the one hand and production units up and downstream in the production sequence, on the other. Hirschman, A.O., the strategy of economic development, 1958.
10. Cardoso, 1979.
11. Quoted in Peter Evans: Dependent development, the alliance of multinational, state and local capital in Brazil, 1979, p 31.
12. Evans, P., 1979, p 32.
13. In this respect the concept 'black boxes' refers to the transfer of technology as one whole package in which no insight is given into separated parts.
14. Evans, P., 1979, p 162.
15. Evans, P., 1979, p 48.
16. Evans, P., State, internal and foreign capital in Brazil, in Diana Tussie, Latin Ameria in the world economy, Gower Press, Aldershot, 1983.
17. Evans, P., 1979, p 290.
18. Gwynn, R.N., 1986, p 128.
19. Evans, P., 1979, p 164.
20. One speaks of 'de-nationalization' when local enterprises are taken over by foreign companies thereby decreasing the degree of national capital in that particular sector.
21. Evans, P., 1979, p 120.
22. Manghalagiri, 1989, p 2.
23. Gereffi, G. and Evans, P., 3, 1981, p 47.
24. By 'Mexicanization' is meant the policy that foreign investments in Mexico have to take place in the form of joint ventures. Furthermore, the foreign partner is allowed to participate with minority shares only.
25. Evans, P., State, capital and the transformation of dependence: the Brazilian computer case, World development, vol 14, no 7, (791-808), 1986, p 803.
26. Evans, P., 1979, pp 94 en 287.
27. Evans, P., 1979, p 50.
28. Evans, P., 1979, p 50.
29. To mention a few: Newfarmer, R., "Transnational conglomerates and the economics of dependent development, a case study of the international electrical oligopoly and Brazil's electrical industry", Conneticut, Greenwhich, 1980 Evans, P. and Gereffi, G., "Transnational corporations, dependent development and state policy in the semi-periphery, a comparison of Brazil and Mexico", in: Latin American Research Review nr. 16 (31-64), New York 1981.
30. "(-) The multinationals converge from several different origins", Evans, P., 1979, p 180.
31. In the early seventies, Evans proved his assertion that Brazil was becoming generally less attractive to foreign investors with statistics and figures relating to American transnationals only. Evans does not mention, however, that the declining American

investments in Brazil during this period were an exception and did not include European and Japanese investments. Evans, 1983, pp 80. Another illustration is formed by the remarks of Evans concerning local product innovation of foreign firms. Evans included only American multinationals in the research sample. Evans, 1979, p 173.

32. Evans, P. 1983.
33. Grosse, R., ed. Multinationals in Latin America, Routledge, 1989 London. p 35.
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38. Dunning, J.H., Explaining International production, Unwyn Hyman, London, 1988.
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40. Hymer, S., The United States multinational corporations and Japanese competition in the Pacific, in: The multinational corporation, A radical approach, Cambridge University Press, Cambridge, 1970, p 3.
41. Ibid., p 246.
42. Ibid., p 250.
43. Lee, Chung H., On Japanese macroeconomic theories of direct foreign investment, in: Economic development and cultural change, 1984, (713-723) p 717.
44. One must bear in mind, however, that the initial research of Kojima, upon which most of his later ideas are based, was undertaken in the seventies when Japanese foreign investments were just starting to become important.
45. Nakase, T., Some characteristics of Japanese-type multinationals today, in: Capital and Class, 13, (61-98) 1981, p 62.
46. Oguro, K., Japan's direct investments towards Asia facing turning point, in: Digest of Japanese Industry and technology, 1986, no 217, (11-16), p 11.
47. UNCTC, Transnational Corporations in World Development, Trends and Prospects, New York, 1988, pp 78 and 79.
48. Although, in this chapter, a distinction will be made between American, European and Japanese companies, it is important to stress that differences within continents cannot be neglected. While generalizations about Japanese and American firms are difficult to make, because differences are less pronounced, generalizations including, for example, an Italian and a German firm are of a different nature. Nevertheless, the similarities that do exist between different European transnationals justify use of the term European transnational company in general.
49. Jones, G., British multinationals, origins, management and performance, London School of Economics, London, 1986, p 28.
50. UNCTC, 1988, p 79.
51. Nakase, 1981, pp 65 and 74.
52. Dicken, P, Global shift, Industrial change in a turbulent world, Harper and Row Publishers, London, 1986, p 72.
53. Ibid., p 75.
54. Kojima, K., Direct foreign investment, a Japanese model of multinational business operations, Croom Helm, London, 1979, p 86.
55. A clear definition of "Sogo Shosha" is given by Nakase: "(Sogo Shosha's are) huge conglomerate-type union of commercial and industrial capitals, having mainly grown up from the trading companies of the former Zaibatsu concerns". Nakase, 1981, p 71.
56. Kojima, K., 1979, p 150.
57. Ibid., p 135.
58. Ibid., p 145.
59. "It is also better to transplant technology suited to local factor proportions through small- and medium-sized enterprises which usually operate in more competitive systems, rather than massive enclaves. In this sense the Japanese style of investments is more appropriate to developing countries." Kojima, K., 1979, p 94.

60. Kojima, K., 1979, p 147.
61. Kojima based his conclusions mainly on foreign investments in developing countries. One can also question the degree to which the different outcomes of the two researches can be explained by the time factor. Kojima did his investigation in the 1970s while Dunning's description of the characteristics of the Japanese firms dates from the 1980s.
62. Dunning, 1988, p 123.
63. Kojima, K., 1979, p 136.
64. Nakase, 1981, p 77.
65. Taddesse, M., The experience of Japanese joint business ventures in developing countries, in: V.R.F. series no 128, Institute of Developing Economies, Bangkok, 1986.
66. Taddesse, M., 1986, p 76.
67. Taddesse, M., 1986, p 77.
68. Kojima, K., 1979, p 140.
69. Dunning, J.H., 1988, p 51.
70. Sekiguchi S, and Krause, L. B., Direct foreign investment in Asean by Japan and the United States. in: Ross Garnaud, ed. Asean in a changing Pacific and world economy, Canberra, Australian National University press, 1980, (421-452).
71. Sekiguchi S, and Krause, L. B. 1980, p 438.
72. Ronald Findly's contribution to the publication of Sekichugi and Krause, Direct foreign investments in Asean by Japan and the United States, 1980, p 449.
73. UNCTC, 1988, p 78.
74. Beamish, P.W., Multinational joint ventures in developing countries, Routledge, London, 1986, p 1.
75. Ibid.
76. Taddesse, M., 1986, p 18.
77. Kogut, B., 1988.
78. Kogut, B., 1988 p 320.
79. Ibid., p 322.
80. Ibid., p 323.
81. Foreign/local joint ventures, consist of at least one partner from a developed country and one partner from the Third World host country in which the joint venture is located.
82. Beamish, P. W., 1986, p 12.
83. Stopford and Wells (1972) cited in Beamish, 1986, p 25.
84. Kogut, B., 1988 p 328.
85. Jones, G., British multinationals, origins, management and performance, Gower, Aldershot, 1986, p 17.
86. Hladik, K., International joint ventures: an economic analyses of US-foreign business partnerships, Lexington books, Toronto, 1985, p 11.
87. Kojima, K., 1979, p 149.
88. Negandhi, A. R., External and internal functioning of American, German and Japanese multinational corporations: decision making and policy issues, in: W. H. Goldberg, A. R. Negandhi, Governments and multinationals, the policy of control versus autonomy, Oelgeslacher, Cambridge, 1983, p 36.
89. Sekiguchi S. and Krause, L. B., 1980, p 425.
90. Taddesse, M., 1986, p 65.
91. Jones, G., 1986, p 11.
92. Beamish, P. W., 1986, pp 12 and 2.
93. Ibid., p 13.
94. Ibid., p 15.
95. Japanese state capital has played a role in initiating the developments of both national and private capital in neighboring host countries, Nakase, 1986, p 61.
96. Dicken, P. 1986, p 158.
97. "Indeed there is relatively little state-owned enterprise in Japan (-)"; Dicken, P., 1986, p 158.
98. Hladik; K., 1985, p 15.
99. Beamish, P. W., 1986, p 20.
100. Ibid., p 103.
101. Kogut, B., 1988, p 329.
102. Beamish, P. W., 1986, pp 16 and 17.

103. Negandhi, A., 1983, pp 24 and 27.
104. Dunning, J.H., 1988, p 230.
105. Barlett C. A. and Ghoshal, S., Managing across borders, the transnational solution, Hutchinson Business Books, London, Great Britain, 1989.
106. Ibid. 1989, pp 158-163.
107. Taddesse, M., 1986, pp 69 and 73.
108. Expatriates refers to firm executives who do not originate from the country in which the subsidiary is located.
109. Beamish, P. W., 1986, p 34.
110. Ibid. 1986, p 34.
111. "(-) In LDC's, in addition to the level of uncertainty and the foreign parent's desire to be in control, there is a lack of managerial depth." Beamish, 1988, p 81.
112. Dunning, J. H., 1988, p 227.
113. Sekiguchi S. and Krause, L. B. , 1980, (421-452), p 440.
114. Barlett C. A. and Ghoshal, S., 1989, p 37.
115. Nakase, 1981, p 74.
116. "In order to avoid misunderstandings, due to inter alia language and/or different ways of gathering and presenting information, it is not surprising that most heads of financial departments in Japanese affiliates are Japanese nationals, and that, usually, Japanese production managers and chief technicians are appointed to ensure a free exchange of knowledge and ideas between themselves and their counterparts in Japan or heads in R&D departments. Accepting this, however, special attention is given to the training of these managers in the Japanese way, while there is usually a senior Japanese expatriate in the staff of these departments. In the case of US subsidiaries these constraints are not as severe." Dunning, J. H., 1988, p 227.
117. Barlett C. A. and Ghoshal, S., 1989, p 86.
118. Kojima, K., 1979, p 153.
119. Negandhi, A., 1983, p 33.
120. Hofstede, G., Culture's consequences, Sage Publications, Beverly Hills, 1980.
121. Barlett C. A. and Ghoshal, S., 1989, p 45.
122. Nakase, 1981, p 77.
123. Dunning, J. H., 1988, p 227.
124. By corporate culture is meant the internal characteristics of the management structure of the companies, the decision making structure, the organization of production, the business mentality.
125. Nakase, 1981, p 73.
126. Dunning, J. H., 1988, p 226.
127. Rowland, D., Japanese Business etiquette, Warner Books inc, New York, 1985 p. 26.
128. Negandhi, A., 1983, p 36.
129. Evans, P. Collectivized capitalism: integrated petrochemical complexes and capital accumulation in Brazil,in: Bruneau, T.C. and Ph. Faucher, Authoritarian capitalism, Westview Press, Boulder (Col), 1987.
130. Amongst others the libraries of Petroquisa; the Getulio Vargas Foundation; the Federal University of Rio de Janeiro; the post graduate institute IUPERJ; the social-economic research institute IBASE; the central Bank CACEX, the geographical statistical institute IBGE and the National Development Bank BNDES.
131. Among them the technical institutes FINEP, INPI, CNPq, CENPES, the trade unions (laborers as well as employers) Dieese, CUT, ABIFINA, ABIQUIM, Sindipetro and Sinproquim and some journalists of relevant magazines.

3

THE DEVELOPMENT OF THE CHEMICAL INDUSTRY IN BRAZIL

3.1. Introduction

In the previous chapter, theoretical assumptions with respect to the role multinational enterprises play in the industrialisation process of Third World countries were presented. The research of Evans, in which he explains the impressive industrial growth of Brazil due to the occurrence of a so-called triple alliance, received considerable attention. Although Evans describes several industrial sectors in his research, he emphasizes that the petrochemical sector in Brazil was the most outstanding example of a triple alliance agreement. In addition to the fact that the different types of capital are more or less equally present in the petrochemical sector, it is also a sector of a considerable magnitude. For this reason the petrochemical sector in Brazil is a good example for investigating the functioning and the impact of the triple alliance in a developing country.

In this chapter the highly integrated character of the chemical sector in general will be discussed. The petrochemical branch is strongly related to other branches: the petroleum branch and the final chemical branch. Together these branches form the chemical sector. The characteristics of the three branches will be described respectively in the first section. Since the petrochemical branch is the main subject in this book, the remainder of this chapter will concentrate on this branch only.

A brief view of the international development of petrochemical production can give some idea of the role and position of the Brazilian petrochemical industry in the world. Therefore in section 3.3. the development of petrochemical production on a global scale will be outlined. From this part of the chapter it is possible to see that Brazil is ranked as 11th largest petrochemical producer in the world. This is noteworthy because Brazil can neither be included among the large oil producing developing countries, like Mexico, Venezuela and Indonesia, nor can it be compared with Western countries that base their petrochemical industry on imported oil.

How Brazil reached the 11th place and the manner in which the petrochemical industry in Brazil developed, are interesting questions. To answer these questions, some general economic figures concerning the demand structure, the production structure and the balance of trade of the petrochemical industry will be presented in section 3.4. From these figures it is clear that the petrochemical industry experienced a tremendous growth from the sixties to the end of the eighties.

In section 3.5. some reasons for this growth will be presented: in the period 1960 - 1980 three petrochemical complexes were created with a present total ethylene capacity of over 12 million tons annually. In the sixties, the petrochemical industry began in the São Paulo region where separate enterprises developed around the

metropolis. The second impulse for the petrochemical industry was given by the Camaçari petrochemical complex, which started production in 1979 and is situated in the north-eastern region, in the state of Bahia. Finally, the third petrochemical complex was constructed in the extreme south of Brazil, in the state Rio Grande do Sul. This Polosul complex started production in 1982.

Despite the fluctuating demand and production figures in the petrochemical industry during the seventies, prospects looked so bright by the second half of the eighties that a National Petrochemical Programme was implemented in 1987 which included a plan for the expansion of petrochemical production. The details of this programme can be found in section 3.6.

Finally, for a better understanding of the development of the Brazilian petrochemical industry, the shift from basic and intermediary chemicals to fine chemicals is important. World wide petrochemical producers seem to have increased their investments in fine chemical production such as pharmaceuticals and agricultural chemicals. This tendency is also of great significance in Brazil.

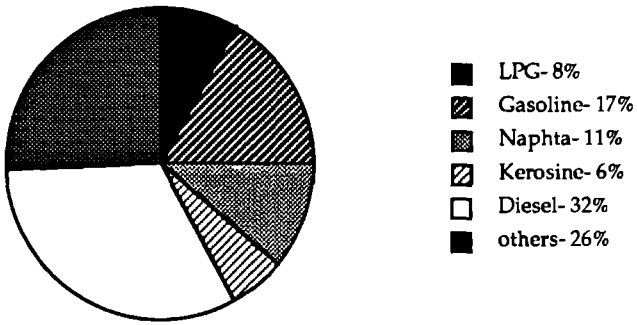
3.2. Characteristics of the chemical and petrochemical industry

Vertically, the chemical sector is a highly integrated sector; the output of one chemical branch forms the input for another chemical branch. In order to have a good understanding of the development and the role of the petrochemical branch, it is necessary to have a clear view of the chemical sector in general and the interrelations between the various branches within this sector. The petroleum branch can be found at the beginning of the chemical chain, followed by the petrochemical branch. The chain is closed by the final chemical branch.

3.2.1. The petroleum branch

The basic materials used by the chemical sector are provided by the petroleum branch which constitutes an important part of the chemical sector in regard to production value and value added. The activities of this branch consist of the exploration for crude oil and gas, the refining of oil and gas, and the distribution of gasoline and diesel. The most important raw material is crude oil. After refining, products like naphtha, gasoline, petrol and diesel, amongst others, are obtained. (see figure 3.1.). A large number of these products are used as input for other chemical branches and are not sold directly to consumers.

Figure 3.1. Derivatives from one barrel crude oil in 1985 in percentages



source: Petrobras, 1986

This branch is highly capital intensive in nature and production takes place on a large scale. A sophisticated technology is used which is not subject to rapid changes. This implies that only very large firms are able to participate due to the high capital risks. Therefore, worldwide, the petroleum branch is dominated by either large transnational corporations or by state-owned companies.

3.2.2. The petrochemical branch

The petrochemical industry can be defined as an industry producing synthetic organic chemicals using petroleum or gas fractions.[1] The inputs used in the petrochemical branch can vary: the most commonly used are naphtha and natural gas. Alcohol however, may form an alternative input as well as other sub-products derived from refining oil, like residual gas. While naphtha, as stated earlier, originates from oil refineries, natural gas is a direct feed-stock that does not need any further treatment. Gas is less flexible in use and the range of products that can be produced is limited.[2]

Petrochemical production includes more than 1000 individual products that are arranged in a particular industrial chain. In this chain a distinction is made between three different production groups: the basic production group or first generation; the intermediate production group or second generation and the final production group or third generation. The first generation of products is produced in a central cracking unit. Here, at the heart of the petrochemical complex, feedstock such as naphtha - which can be used as input for the second generation, the down stream petrochemical firms - is transformed. Several products can be derived: firstly the olefines such as benzene, ethylene, propylene, butane and the like; secondly,

aromatics such as esthyrene, toluene and xylene; and, finally, the products distilled from synthetic gas. (see figure 3.2.)

In the second generation firms, the olefines and aromatics are transformed into intermediary products like, for example, the styrene, vinyl chloride, caprolactam and monomers. The output of the second generation firms may be used as input for the third generation firms but third generation firms can make direct use of output from the first generation as well. In the third generation, a large range of final chemicals are produced, divided into five sub-groups: thermoplastics such as polyethylene, PVC, polystyrene and polypropylene; synthetic rubbers; synthetic fibers, like nylon and polyester; fertilizers, like urea; and detergents.[3]

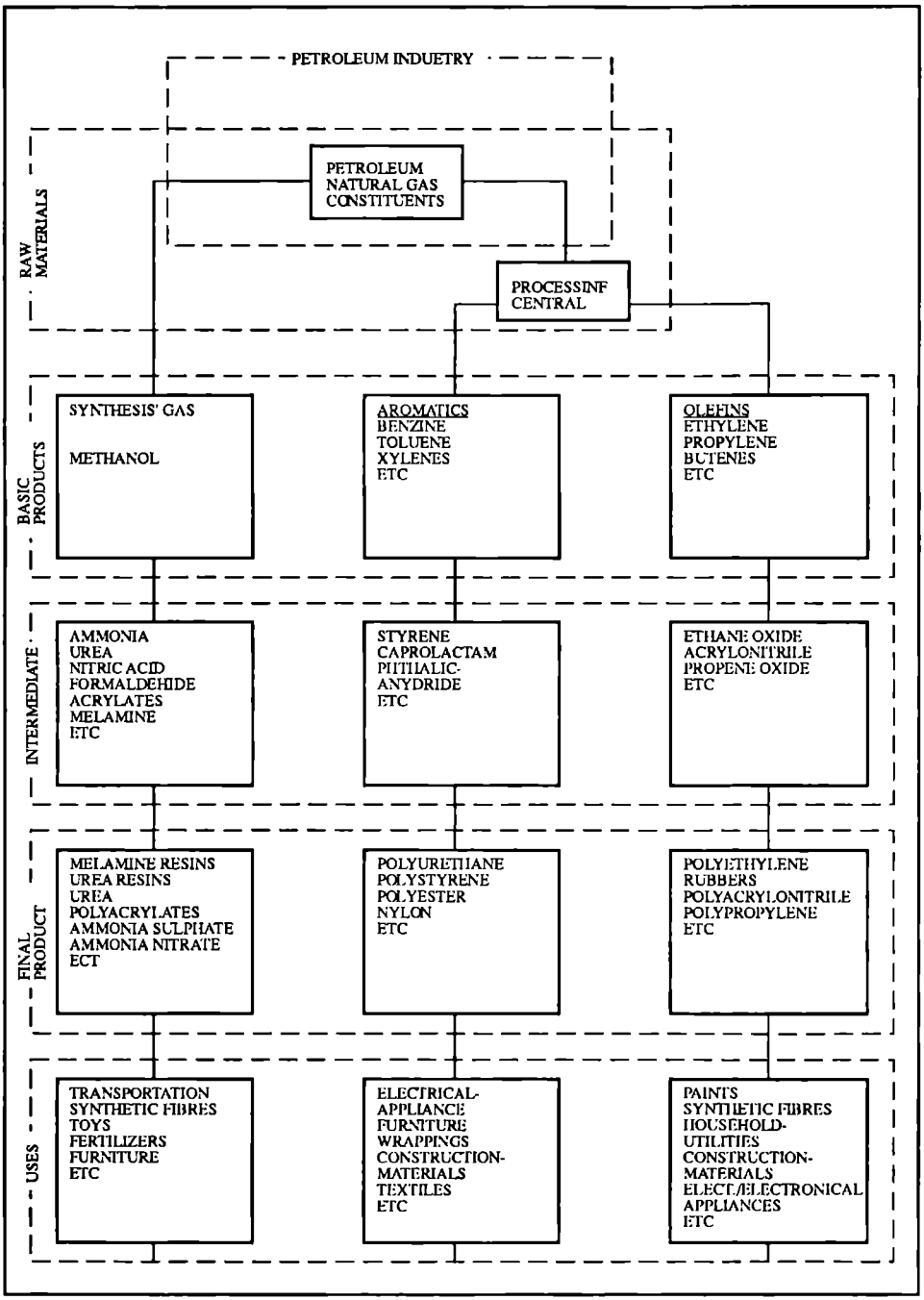
The bulk of the goods produced by the petrochemical industry can not be considered final products. They serve as input for the secondary processing industries, which are called the fourth generation. The automotive industry that is supplied with syntectic rubber tires is an example of a fourth generation branch; the textile industry using nylon threads another.

Three characteristics are of importance in the petrochemical branch. Firstly, the branch is highly capital intensive which means that a large scale is needed for efficient production. Investment costs per produced unit are, therefore, relatively high. Smaller firms are less able to participate, given the need to mobilize large capital resources and take on substantial financial risks. Secondly, the petrochemical industry requires sophisticated Research and Development. To obtain a better understanding of the technology requirements of the chemical sector, it is necessary to analyze the concept 'technology' in somewhat more detail. A distinction needs to be made between process technology and product technology.

Process technology is the technology needed for the improvement of the production process in order to obtain higher production figures at lower costs. For the petrochemical industry, this type of technology is the most important. In general, the improvement of the production process in the petrochemical industry focuses on reducing the energy costs, for two reasons. First is the enormously high energy needs of the petrochemical industry and second is the relatively small variation in inputs. In the last decades, good progress has been made with respect to technological process improvement. As a result, in order to reduce energy costs further, an even more sophisticated and thorough R&D is needed.[4] Firms that wish to participate in this branch must either have access to the newest developed technologies or must heavily invest in Research and Development themselves.

The second type of technology, product technology, is of minor importance for the petrochemical industry. Product technology is the technology needed to innovate products themselves; in other words, to invent new products in order to conquer new markets or to beat competitors. Logically, this kind of technology is more important in industrial branches closer to the consumer, such as the pharmaceutical branch. The petrochemical branch, however, as a supplier of inputs to the consumer industry, is less dependent on product innovation.

Figure 3.2. The different petrochemical generations and their interrelations with the petroleum and the final chemical branch



source: Teixeira, 1985

Finally, the third characteristic of the petrochemical branch is the specific nature of the labour force. In order to reach high efficiency levels, well-trained employees are needed. Compared to other industrial branches, the labour force in petrochemical production is rather small but highly skilled. The place of the petrochemical branch in the industrial sector as a whole is characterized by the relatively large importance of its backward and forward linkages. Backward linkages are generated in the capital goods industry in particular, while forward linkages can be found in the fourth generation, i.e. the secondary processing industry.

3.2.3. The final chemical branch

The last group of firms that composes the chemical industry is formed by the final chemicals. Suarez[5] makes a distinction between fine chemicals and other final chemicals like textile, plastics, fertilizers and the like. The names are the source of some confusion but fine chemicals can be considered a sub-branch of the final chemical branch. (see figure 3.2.) The definition 'fine chemicals' is used to indicate the more sophisticated final chemical products, such as pharmaceutical products, insecticides and the like. The inputs of this branch of final products are formed, although not exclusively, by the intermediary products from the second and third generation of the petrochemical branch. Because of its disparate nature, a wide variety of products can be found in this branch, varying from insecticides or plastic bags to aspirins.

Although it is difficult to generalise about the final chemical branch as a whole, it can be said that its characteristics differ from those of other branches in the chemical sector. Among these characteristics is the relatively low level of capital investment per unit produced. As a result, economies scale are of less importance and smaller firms are, therefore, more easily able to participate. However, the high level of product technology and the necessarily high costs of Research and Development are a barrier to participation by small firms in some sub-branches, such as the fine chemical and pharmaceutical sub-branch. In addition to the high technological level, the applied technologies change very rapidly, making it difficult for smaller firms to compete with large transnational corporations. Exceptions include the plastic -except for the engineering plastics- and the fertilizer sub-branch, with their relatively simple technology.

The high value added of some of the final chemical sub-branches distinguishes this branch from the petroleum and petrochemical branch. The value added of the fine chemical sub-branch in particular is substantial. Again, the plastic and fertilizer sub-branch are exceptions. As in the petrochemical branch the labour force is small but highly skilled; except for mass production in the plastic industry, in which a large number of unskilled labourers can be found. Patent and mark registration and advertizing are especially important for the fine chemical sub-branch. According to Hagenauer, these present greater barriers to participation in the branch than the high technological level.[6] The marketing of pharmaceuticals, for example, is largely

based on commercials and advertisements. This makes it very difficult for smaller, unknown firms, to enter the market.

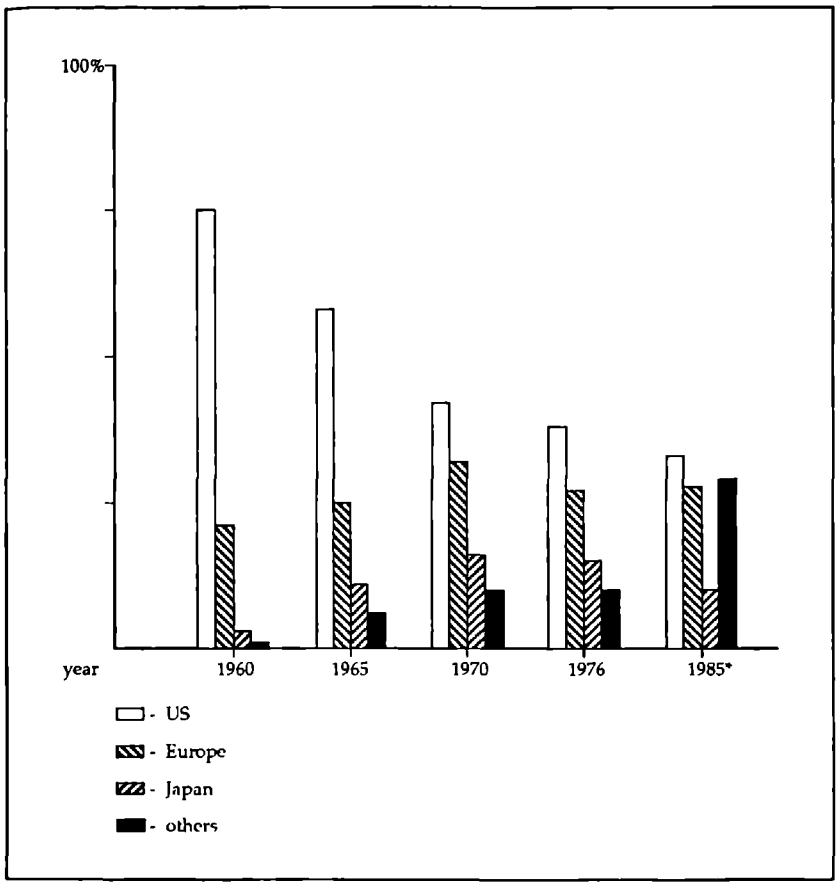
Due to its specific characteristics, the fine chemical sub-branch is dominated by transnational corporations. This contrasts with the plastic and fertilizer sub-branch in which smaller nationally owned firms can also be found. Hagenauer states that only 5% of all firms producing fertilizers are in foreign hands and the production of plastic consumer goods takes place in some 2.600 small private national firms and only a few large transnationals.[7]

3.3. The development of the petrochemical industry on a world scale

The petrochemical industry is a relatively young sector of production. The production of isopropyl alcohol out of refinery gas by Standard Oil of Ohio in 1920 is generally seen as the first step in the direction of petrochemical production.[8] The Second World War provided an enormous stimulus for this industrial branch -the rate in which new technologies for petrochemical production were invented was impressive- and in the United States in particular, production increased considerably. From the start of petrochemical production, the United States was considered the world leader, a position which it still maintains. After World War II the production of petrochemicals began in European countries as well, but this production was based on the feedstock naphtha. Because of the higher costs involved in this production process, production increasingly took place in integrated petrochemical complexes.[9] The dominance of US and European companies diminished when Japanese firms started producing at the beginning of the sixties. Based on imported technology Japan began to construct its own petrochemical complexes. In the eighties, another group of participants joined the international producers of petrochemicals: the developing countries and the countries of the Middle East. In figure 3.3. the importance of different regions based on the production of ethylene[10] is presented. Noteworthy is the increasing share in the category of 'others' during the last decades. Developing countries and the Middle East are included in this category.

With such a large number of players in the international petrochemical scene, the production increased considerably. In 1920, the world production of petrochemicals was only a few hundred tons; in 1950 production had increased to 3.5 million andin 1976 it reached 70 million tons. Between 1953 and 1978 the annual growth averaged 14%.[11] At the end of the seventies, the boom in petrochemical production began to slow down, however. The first oil crisis of 1973 resulted in an increase in feedstock prices and the overcapacity of production led to saturation of the market. Furthermore, the rate of innovations slowed down considerably as it became apparent that the benefits of the economies of scale had reached their limits.

Figure 3.3. Regional share of ethylene capacity in percentages



1985: estimated production capacity

source: Teixeira, 1987

To give an idea of Brazil's place in international petrochemical production, ethylene production is once again referred to. In table 3.1. ethylene production in several countries is presented, demonstrating the absolute dominance of the US and the important place of Japan as the second largest producer. Also, the position of up and coming countries like such as Saudi Arabia, China, Mexico and Taiwan, is shown. In the ranking of ethylene producing countries, Brazil is 11th.

3.4. The economic development of the Brazilian petrochemical branch

In order to provide more information on the development of the Brazilian petroche mical sector, the demand for petrochemical products, the production figures of the petrochemical industry and the balance of trade of the branch will be described in this paragraph.

Table 3.1. The most important installations of ethylene in the world in 1985 (X 1000 ton/ annually)

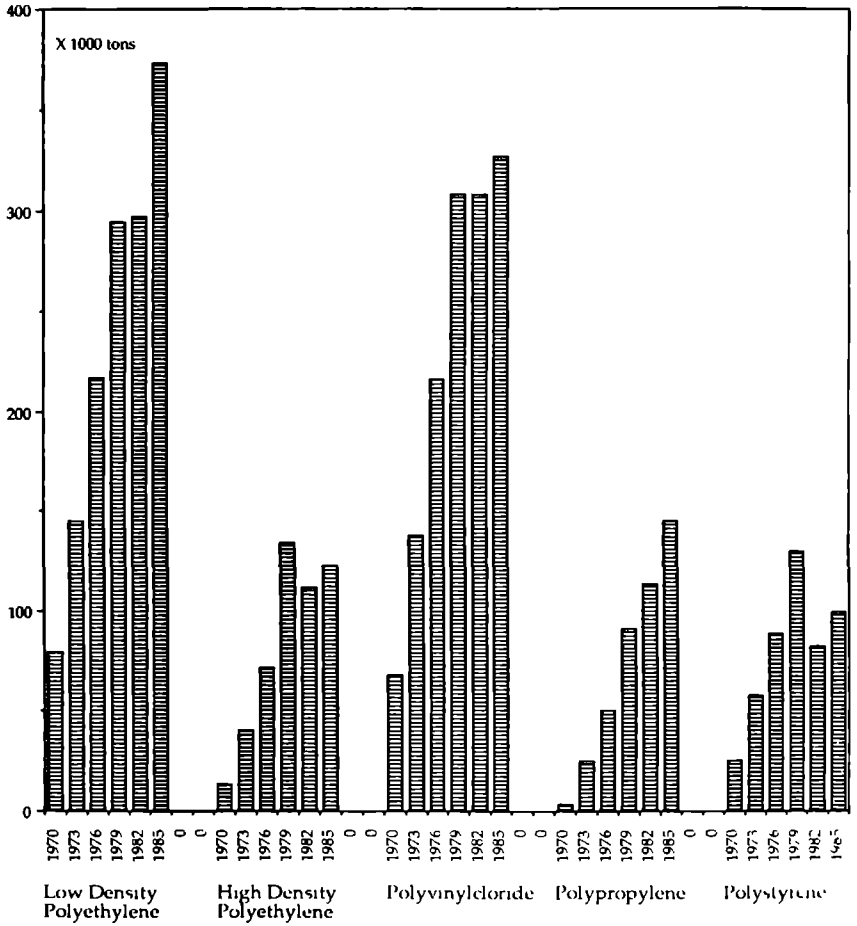
US	16.300	Saudi Arabia	1.600
Japan	4.500	Italy	1.500
Germany	4.000	Brazil	1.400
USSR	2.800	China	1.300
Holland/Belgium	2.700	Taiwan	1.000
France	2.500	Spain	950
Canada	2.200	Mexico	940

source: Petro & Gas, 1986

3.4.1. Fluctuating demand for petrochemical products

In the sixties, the Brazilian industrial sector experienced a period of impressive growth. In this period, known as Brazil's 'economic miracle', GNP growth figures of more than 10% where reached. As a rule of thumb the petrochemical sector will experience a growth of 1.5% with a GNP growth of 1%. So, due to the large degree of industrialisation, the internal demand for petrochemical products increased rapidly. In figure 3.5. the internal demand for the most important petrochemical products - thermoplastics originating from the third generation - for the seventies and early eighties is presented. The increase in demand for low density polyethylene (PEBD) was particularly impressive. The average growth rate in the demand for petrochemical thermoplastics between 1968 and 1983 was 13.7%.[12] Between 1979 and 1982, however, a relative stagnation occurred. The growth of demand increased only slightly for low density polyethylene and polypropylene. The demand for polystyrene declined sharply. This stagnation was due to the two oil crises of 1973 and 1979, which dragged Brazil into a heavy recession at the beginning of the eighties.[13] In the second half of the eighties, the economy recovered and the internal demand began to rise once again: in 1987, the internal demand for petrochemical intermediate products increased by 15 to 20%.

Figure 3.4. Brazilian internal demand of thermoplastics between 1970 and 1985, (X 1000 ton)

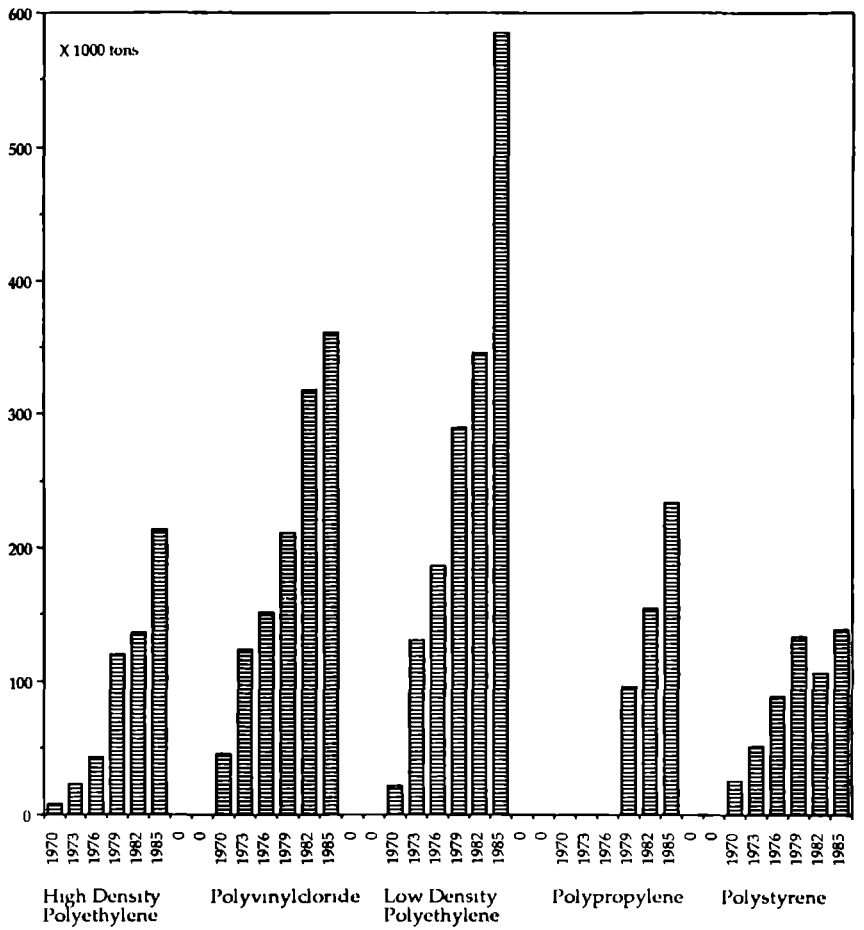


source: Annual reports Petroquisa and Abiquim

3.4.2. Production growth and stagnation

National production of petrochemicals in Brazil grew significantly in the seventies. As can be seen in figure 3.5., the production of the five major thermoplastics increased considerably. During the eighties this growth slowed down, however. In addition to the economic recession, this stagnation was caused by the low profitability of petrochemical production due to heavy price controls implemented by the government agency CIP.[14] While inflation increased continuously during this period and unions demanded salary increases in line with this high inflation rate, the CIP allowed the petrochemical firms only moderate price increases.

Figure 3.5. Brazilian petrochemical production of thermoplastics between 1970 and 1985, (X 1000 ton)



source: Annual reports Petroquisa and Abiquim

Furthermore, the increasing prices of input after the two oil-shocks heavily effected the Brazilian petrochemical industry since petroleum was both the main source of feedstock and the most important energy supplier.

In the second half of the eighties the prospects for the petrochemical industry seemed to brighten. While in 1984 the growth of petrochemical production was only 4%, in 1985 a growth of 10% was realised.[15] Some products such as polypropylene, even experienced a growth of 25%.[16] But looking at the growth figures for basic

petrochemical production and the production of some thermoplastics during the years 1984 to 1988, the increase in production proved very temporary (see table 3.2.). At the end of the decade, the situation for the petrochemical industry as a whole appeared once again to be precarious. Although there was eventually a growth in production, it was very moderate indeed and was interrupted by stagnation. There was a slightly upward trend in the production of most of the basic petrochemicals; with respect to the production of the major thermoplastics, however, only the production of PVC increased from 1984 to 1988, while production of the other thermoplastics decreased.

An explanation for the production figures which lagged behind expectations can once again be found in the strict CIP regulations, which negatively effected the profitability of the petrochemical industry. With salary adjustments in 1988 and 1989 totalling 5000%, price adjustments of 'only' 3000% were considered highly insufficient[17]. The low profitability did not provide an incentive for increasing production.

Table 3.2. Production figures for basic petrochemicals and thermoplastics in the Brazilian petrochemical industry, 1984-1988 (X 1000 ton)

year/ basic petrochemicals	1984	1985	1986	1987	1988
Ethylene	1.262	1.304	1.306	1.291	1.307
Butane	197	220	205	193	203
Propene	674	824	719	684	710
Benzene	490	515	524	469	484
Toluene	141	184	174	125	135
Xylene	362	363	151	169	84
Naphthalene	11	13	14	9	10
Thermoplastics					
PEAD*	208	214	234	194	188
PEBD	508	585	698	450	442
PS	116	151	185	80	75
PVC	326	361	406	334	346

source: Veja, may 1989

PEBD = Low Density Polyethylene
PEAD = High Density Polyethylene
PVC = Polyvinylcloride
PS = Polystyrene

3.4.3. Impressive change in balance of trade

The influence of the petrochemical industry on the Brazilian balance of trade was negative during the seventies but has shown a positive trend during the last decade. In the seventies the growth of national petrochemical production proved to be insufficient to satisfy the high internal demand, which resulted in an increase in petrochemical imports. As the export of petrochemicals was negligible, the balance of trade for petrochemicals during these years highly deteriorated. (see figure 3.7.). From the beginning of the eighties, this situation gradually changed. After 1980, the export of petrochemicals started to increase rapidly. Whereas the export coefficient was a negligible 2.7% in 1980, it has increased to 40% in 1984, turning the petrochemical branch into a very important export sector.[18]

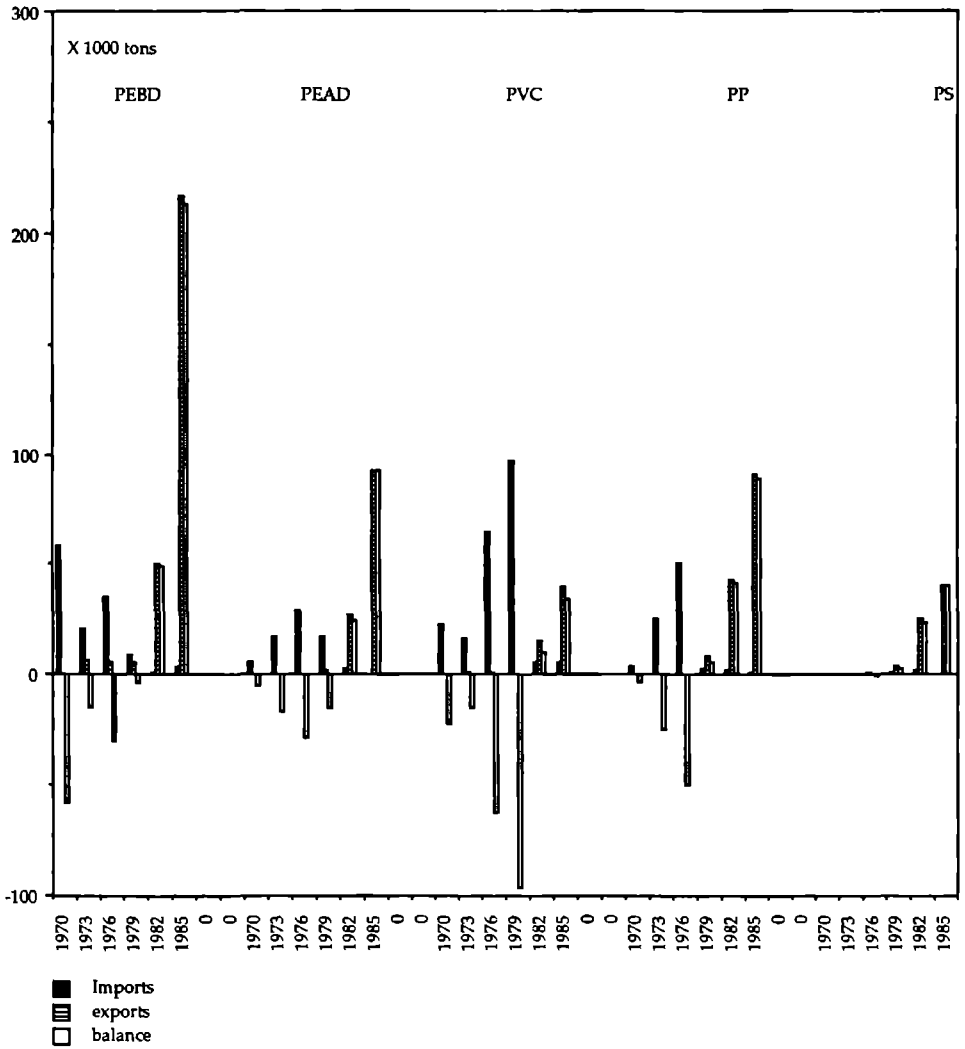
The reasons for this change can be found in the demand/production structure of the petrochemical industry. The second oil shock in 1979 not only effected the petrochemical industry negatively, but also resulted temporarily in overall stagnation of the Brazilian economy. Just at that time, the petrochemical industry had increased itscapacity considerably and not enough customers could be found to buy its products. The solution was found outside the country. During this particular period, the international demand for petrochemical products was relatively high and, although world market prices were much lower than internal Brazilian prices, export of excess production was seen by the petrochemical branch as the only solution. "The Brazilian petrochemical industry (-) developed a vigorous force as exporter by using its overcapacity during a recessive period. The exports constituted an adequate solution for the observed reduction in the internal consumption."[19] Thus from the beginning of the 80s, Brazil started to export part of its petrochemical production. As can be seen in figure 3.7. the balance of trade for all major petrochemical plastics was positive in 1982.

In the second half of the eighties, and especially after the Cruzado plans[20], the situation changed. As part of the Cruzado plans, the government installed a restrictive price policy in 1986 which resulted, among other things, in prices for petrochemical products that were far below world market prices. As a result of the general freeze of almost all prices, internal demand, especially for consumer goods, increased rapidly and became difficult to satisfy. Consequently, in the second half of the 80s the demand for petrochemical products, a necessary input for the production of a large amount of durable consumer goods, started to rise as well. Because the petrochemical producers were afraid to loose important market segments, they had to fulfill this internal demand. Thus, despite the more attractive prices paid on the international market, compared to the Brazilian internal market, the amount of exports declined. Whereas in 1985 the total amount of petrochemical exports reached over 1.6 million US dollars, in the year thereafter this figure fell to 1.3 million US dollars.[21] The export coefficient, which was 40% in 1984 and 1985, declined sharply to only 20% in 1986.[22]

From the above is clear that, despite periods of severe instability during previous decades, the overall trend within the petrochemical branch has been positive:

production is still increasing moderately and the surplus in the balance of trade although smaller than at the beginning of the eighties- is still significant. How did a developing country like Brazil realize such impressive petrochemical development, transforming it from a net importer to an exporter of petrochemical products? How did Brazil manage to change its petrochemical balance of trade from a total deficit of 380 million US dollars in 1980 into a surplus of 609 million US dollars in 1985?[23]

Figure 3.6. The commercial balance of the Brazilian petrochemical industry between 1970 and 1985, (X 1000 ton)



source: Petroquisa and Abiquim

3.5. The construction of the petrochemical complexes

The impressive development of the Brazilian petrochemical industry is largely due to the creation of three petrochemical complexes. In this section, the history of the three petrochemical complexes that were constructed between 1960 and 1982 will be outlined, followed by the description of the National Petrochemical Programme (PNP) including the further development of the industry.

3.5.1. The São Paulo complex, the first petrochemical producers

The first petrochemical firms in Brazil were established in São Paulo, the industrial heart of Brazil. In 1959 a rubber firm was constructed under the control of the state company Petrobras, with technical know how obtained from the American transnationals Goodyear and Firestone. Because the petrochemical intermediaries, used as input for this rubber-plant, needed to be imported, two petrochemical projects were designed in order to substitute for these imports. Union Carbide, an American-based transnational, constructed a plant with a production capacity of 120.000 tons ethylene per year, which made use of a new type of cracker known as the Wulff cracker. Capuava, a national firm with experience in the oil-refining sector, decided to build an ethylene plant with an annual production capacity of 167.000 ton. Although for both projects the initial period was marked by many technical problems, they can be considered the pioneering companies in what later became the first petrochemical complex in Brazil.

In 1985 the São Paulo complex consisted of 25 petrochemical down stream enterprises scattered throughout this huge industrial metropolis. The Capuava company became the heart of the petrochemical complex: the central cracking unit, Petroquimica União (PqU). PqU began operation in 1972 with a capacity, measured in ethylene production, of 360 thousand tons annually. In 1982 the company succeeded in reaching a production level slightly higher than full capacity: in that year 369 thousand tons of ethylene were produced, all of which were sold to the Brazilian down stream enterprises.[24] In addition to ethylene, the São Paulo complex produces benzene, polypropylene, butane, toluene and several petrochemical intermediary products. At the central cracking unit 770 persons were employed in 1986.[25] Investments in the São Paulo complex totalled 2.1 billion US dollar.

3.5.2. The Camaçari complex: an integrated complex

Although the establishment of the São Paulo petrochemical firms was an important step in the direction of the national production of petrochemicals, production was not sufficient to satisfy the increasing demand in the seventies.

Figure 3.7. Location of petrochemical complexes in Brazil

source: Petrobras,1987

Therefore, the policy of import substitution -which had already been introduced in other industrial sectors under the government of President Vargas (1937-1954)[26], and was continued by President Kubitscheck (1956-1960)- was extended to other branches of the industrial sector such as the petrochemical branch. The main objective was to increase national petrochemical production in order to reduce imports and satisfy national demand. The government institution CNP[27] supported this objective with the creation of a refinery in Cubatão, which made use of the process of 'craqua-

mento termico'. Using this method, a larger amount of gas, which can be used as basic material for the petrochemical industry, can be refined.

In the early seventies, during the administration of President Geisel (1974-1981), plans were made to construct a second petrochemical complex in Brazil. The decision concerning the location of the complex provoked extensive discussions between the federal bureaucracy and the institutions of the state Bahia supported by regional entrepreneurs, on the one hand, and the entrepreneurs from São Paulo, on the other.[28] The first groups used their political influence to persuade the national government that the establishment of a new petrochemical complex should take place in Bahia. They used three kinds of arguments: firstly, an economic argument pointing to the fact that 80% of all oil production in Brazil originates from Bahia. Secondly, a security argument, stating that further petrochemical development in the São Paulo region would increase the countries vulnerability during wartime. Finally, a development argument, focussed on the status of Bahia as one of the most backward states in the country. The dynamic petrochemical sector, with its extensive forward and backward linkages, could trigger regional development.

The dispute was settled in favour of the first groups and at the end of the sixties the decision was taken to construct a second petrochemical complex in the state of Bahia near the state capital Salvador. In 1970 a special committee within the CDI was formed to plan the implementation of the complex. A French consultant was contracted, the BEICIP,[29] to conduct a feasibility study and to research basic engineering possibilities.[30] The north-east petrochemical complex is situated in an area between the villages Camaçari, (from which the complex has its name) and Dias D'Avila. It is located at a distance of approximately 80 kilometer from the state capital Salvador in a more or less flat area, large enough to locate a petrochemical complex and far enough from population centers to reduce the danger of pollution. In 1974 construction of the central cracking unit, Copene, began. This first generation firm, with a capacity to produce 388 thousand tons ethylene annually, started production in 1979. More or less simultaneously, 17 downstream enterprises were constructed.

The complex faced an extremely difficult start. Despite all favourable projections, the internal market did not develop as predicted. In 1978, before the complex even started production, it was estimated that the approximately 300.000 tons of petrochemicals it would produce could not be absorbed by the internal market.[31] To solve this problem of internal oversupply an export strategy was designed. This strategy worked successfully and the petrochemical complex was able to start production for both the internal and the international market. However, in 1980 internal demand diminished drastically resulting in a decrease in the volume of the internal market by 30%. In this period, it seemed impossible to solve the problem just by increasing exports because the projections of international demand for petrochemical products were not as favourable as it had been two years earlier. Since it seemed unlikely that the export strategy would work again, the firms in the petrochemical complex came into serious problems: their initial investment costs were not yet paid off and large debts weighed heavily on the financial balances of the enterprises. The

national government was inclined to subsidize exports of petrochemicals in order to make Brazilian exports competitive internationally and to increase the profitability of the firms. The CACEX, a government institution which coordinates foreign trade, had to implement measures for the purpose of providing incentives to petrochemical enterprises. These incentives made it worthwhile for the petrochemical firms to export which guaranteed the continuation of full production in the complex.[32] As a consequence, not only the downstream enterprises exported their products; the central cracking unit, Copene, which reached its full capacity in 1982, also exported over 10 thousand tons of ethylene that year.[33]

Increasing internal demand for petrochemicals during the second half of the eighties stimulated the production of the Bahian complex and, by 1986, Camaçari was already the most important petrochemical complex of the country. In that year 1.081.000 tons of basic materials were produced, consisting of 416.000 tons ethylene, 240.000 tons propylene, 70.000 tons butane, 197.000 tons benzene, 48.000 tons orthoxylene and 110.000 tons propyxylene. In 1987, Camaçari was responsible for 55% of the national production of petrochemicals.

In the first generation plant, Copene, 1.603 persons were employed, and in the complex as a whole, 24.500 persons. During the 10 years of its existence, the number of down stream enterprises increased considerably and in 1989 some 50 firms were located within its borders. Total investments between 1972 and 1987 were equivalent to 5 billion US dollars.[34]

3.5.3. The Rio Grande do Sul complex: Polosul

Due to the good prospects for Brazil's petrochemical industry at the beginning of the seventies, the national government decided to plan a third complex. The equipping of the new complex with a central cracking unit, Copesul, with the largest production capacity in Brazil was an indication of the high expectations of the Brazilian entrepreneurs at that time. With an annual capacity of 420 thousand tons ethylene, future expansions of the downstream enterprises could take place without any problem.

As in the case of the Camaçari complex, extended discussions were necessary before a decision could be made regarding the location of the new complex. The extreme south of Brazil, Rio Grande do Sul, was considered to be the most acceptable location for a third integrated petrochemical complex. The most important reason for this decision was that 20% of the internal market for petrochemical products was located in the southern states. In addition to this, international markets in the southern cone of Latin America could easily be reached from Rio Grande do Sul. Furthermore, the strengthening of regional entrepreneurial groups was considered to be an important factor in industrial decentralization. A fourth factor in this decision was the political lobby exercised by state technocrats and entrepreneurs of Rio Grande do Sul. As early as 1965 a group of researchers, originating primarily from the BDRE (Banco de Desenvolvimento Regional Economi-

co), designed a project for the construction of the petrochemical complex in Rio Grande do Sul. Finally, the Federal government -Rio Grande do Sul is the home state of President Geisel- together with the regional state bureaucracy can be credited with the decision to locate the complex in Rio Grande do Sul.[35]

The petrochemical complex "Polo Petroquimico do Sul" -Polosul as it is called- is located between the villages Triunfo, Montenegro and Canoas, approximately 55 kilometers north-west of Porto Alegre, the state capital of Rio Grande do Sul. In 1982, the central cracking unit, Copesul, started the production of ethylene, propylene, butane and benzene. Polosul began production at an unfortunate moment in Brazil's recent history. The economic recession was most severe and internal demand for petrochemicals had drastically fallen. As a result, many of the petrochemical firms projected for the Polosul complex had to be cancelled and Copesul produced at only 45% of its capacity. Like the Camaçari complex, Polosul had to look for a solution outside Brazil, in the international market. Aided by the export subsidies of the CACEX, Polosul started to export part of its ethylene production. In relative figures, the southern complex became the Brazilian complex with the highest export figures. In 1984, 29.7% of total production of Copesul was exported, as compared to 15% of the production of Copene and 9.3% of PqU.[36] This did not result, however, in positive financial outcomes. Although a positive balance was reached in 1985, the following year once again showed a deficit and things only began to clear up somewhat at the end of the decade. In 1986, the total production of the central cracking unit increased and full capacity of 453.000 tons of ethylene was reached. Angrisani, the director of Copesul, remarked:

> "For 1987 we hope that the results of the complex will compensate the losses of past year. Maybe it will be possible to zero the negative results at the end of 1987".[37] Because of the fluctuating economic situation, in 1988, six years after the complex came on stream, only 6 downstream plants began production.[38] In the central cracking unit, 1.551 persons are employed as compared to 6,300 in the total complex. Total investments between 1975 and 1985 were 1.3 billion US dollar.[39]

3.6. The National Petrochemical Programme (PNP) 1987-1995

As mentioned before, by the end of the eighties prospects for expansion of the petrochemical branch were once again favourable: the internal and international demand for petrochemical intermediate products increased. Since the ethylene capacity of the central cracking units of the three petrochemical complexes proved insufficient to satisfy this demand, the Brazilian government decided that an expansion of the petrochemical production was most necessary. Several seminars and congresses were organised during which representatives of the government and the private petrochemical industry discussed the various possibilities for expansion.

Photograph 1: The petrochemical complex of Camaçari

Photograph 2: The special infrastructure of the basic material complex

As if history was repeating itself, the main point of discussion was where to realise this expansion. Two possible options were proposed. The first consisted of the expansion of one of the three already existing central cracking units and the increase of the number of downstream enterprises in the existing petrochemical complexes. The second option implied the creation of a new complex near Rio de Janeiro.

The respective governors of the states involved were anxious to attract future industries and all of them highlighted the favourable prospects that the petrochemical industry would find in their state. The governor of Rio Grande do Sul argued that in the Polosul complex not enough second generation plants were established to guarantee a sufficient outlet for the ethylene capacity of the central cracking unit. The existing excess capacity of this plant made expansion of the downstream firms necessary. He was supported by Pedro Simon, then the deputy of state, who would later become governor.

Waldir Pires, the governor of Bahia tried to convince the federal bureaucracy that the Camaçari complex would offer the most propitious solution. He was supported by Molinos, the commercial director of Copene, who predicted only disadvantages for the petrochemical branch if a completely new petrochemical complex in Rio de Janeiro was created. Molinos argued that the majority of second generation firms in the Brazilian petrochemical branch was concentrated in Bahia. And because of the steadily increasing demand for products from already existing down stream enterprises expansion of the production capacity of Copene was necessary. Furthermore, the fact that the infrastructure already existed in the Bahian complex could reduce the time necessary to complete expansion. Whereas it would take seven years to construct a new complex, expansion of Camaçari could be realised within only four years. Consequently, investment costs would be much lower compared to the costs of the Rio de Janeiro alternative. A further disadvantage of a future Rio complex would be that gas, which would be used as a raw material in the new Rio complex, limits the range of intermediaries that can be produced to olefines only. The use of naphtha in Camaçari offered a much broader range of products.[40]

Naturally the proposal to construct the new complex near Rio de Janeiro was heavily supported by the bureaucracy of the state of Rio de Janeiro. More surprising was the support received from some important entrepreneurs of petrochemical firms located in São Paulo. The reason that the latter in particular, the so-called 'paulista' entrepreneurs, were in favour of the Rio de Janeiro complex is clear. Physical expansion of the existing petrochemical firms in the São Paulo region is almost impossible due to the lack of space. Furthermore, the danger of increasing pollution curtailed further industrial growth in the São Paulo region.

An important entrepreneur of the São Paulo petrochemical complex, Michael Hartveld[41], was one of the main advocators of the Rio location, not in the least because of his own interests in investing in the new complex. His position was supported by the governor of Rio de Janeiro, Moreiro Franco, who pointed out that in 1980 the dispute over location of the petrochemical industry was settled by Rio Grande do Sul. According to him, it was time to stimulate industrial development in Rio de Janeiro. The same opinion could be heard from the mayor of Rio de

Janeiro, Saturno Braga, who argued that the decision to locate the second and third petrochemical complex in Camaçari and Triunfo, respectively, was not based on economic arguments but was purely political. Thus, he argued why not locate the fourth petrochemical complex in Rio de Janeiro for political reasons as well. Another argument was that the hegemony of the Camaçari complex would be diminished with the construction of a fourth complex.

There were not only political reasons for changing the decision in favour of Rio de Janeiro, however. According to its supporters, the creation of a new petrochemical complex provided larger economic advantages in comparison with the expansion of one of the existing complexes. The new complex would be based on gas as raw material input which would have many advantages over the naphtha used in the other complexes. The first advantage was that the new complex would not face a scarcity of naphtha and consequent imports of expensive naphtha. The costs of the import of naphtha amounted to 280 million US dollars in 1986.[42] Prognoses were that demand for this feedstock would increase by 40% in the following years. The existing refining capacity in Brazil limits the increase in the production of naphtha by 12 to 15% only, which is insufficient to satisfy demand. In addition, the price of naphtha is highly subsidized: national entrepreneurs pay 70 to 75% of the import price for a barrel of naphtha.[43] Consequently, the use of gas as a feedstock would result in a large reduction in government expenses to the petrochemical sector. Moreover, the exploitation of oil in the bay of Campos, near Rio de Janeiro, will result in an abundance of natural gas.

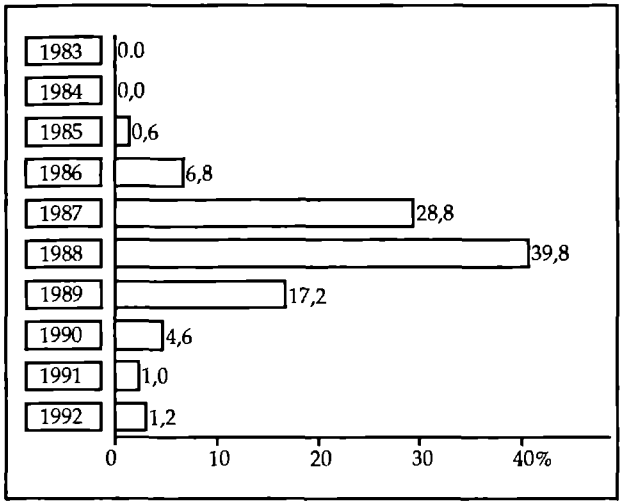
That production based on gas would limit the range of products to olefines was seen as an advantage by the supporters of the Rio complex: whereas in the downstream enterprises the demand for olefines increased 13%, the demand for other petrochemical intermediaries increased only 9%.[44] By using gas, the internal demand structure of the downstream enterprises could be more efficiently satisfied and there would be no oversupply of, for example, butane[45]. The second advantage of using gas as raw material is the low investment cost per tons of intermediaries produced: the cost is only 600 US dollars per tons in stead of 800 US dollars[46]. Thirdly, in the Rio complex transport costs would be lowest. Because a large part of the basic material used in the existing complex of Bahia was transported from Rio de Janeiro to Bahia, and an even larger part of the final products was transported back to the south, an additional 50 million US dollar annually must be added to the total production costs if expansion were to take place in Bahia.[47] Finally, an important reason for locating the fourth petrochemical complex in the state of Rio de Janeiro can be found in the rapidly deteriorating economic situation of this state. As in Bahia, it was believed that the backward and forward linkages of a petrochemical complex would offer a major stimulus to industrialisation in the state.

The intensive lobby campaign of the representatives of petrochemical state institutions, government agencies, political representatives and entrepreneurs of petrochemical firms resulted in a detailed government programme, presented in 1987, in which expansion of the petrochemical complexes between 1987 and 1995 was described: the National Petrochemical Programme (PNP). The total investment

costs forecasted in the PNP will be 3.6 - 4 billion US dollars, of which 1.8 billion US dollars will be financed by the National Development Fund (FND). Those enterprises that wish to invest in the future petrochemical complex have to furnish 40% of the total investment costs from their own capital. Ten percent of the total investment costs can be derived from import of capital goods, the remaining 50% will be provided by development banks and the FND.[48] In 1987 a total of 66 projects were approved by the CDI, the majority of which would begin in 1988. (see figure 3.8.) In the PNP, future development of the four different complexes are described as follows:

- In the São Paulo region the petrochemical industry will be modernized but not expanded. The production capacity of São Paulo's central cracking unit PqU will be increased slightly: from 360.000 to 412.000 tons ethylene annually. Total investment costs for this expansion are not allowed to exceed 25 million US dollars. No investments will be reserved for the down stream plants.
- In Rio Grande do Sul the petrochemical industry will be consolidated and not expanded; nevertheless, the CDI approved expansion projects for some downstream enterprises. In addition, the central cracking unit Copesul will expand its ethylene production by 25%: from 430.000 to 512.000 ton/annually. Total investment costs are calculated to be 35 million US dollar for Copesul and 350 million US dollar for the second generation plants.
- In Bahia the central cracking unit Copene and most of the downstream firms in the petrochemical complex will be expanded. The production of ethylene will almost double from 460.000 to 800.000 tons/annually. Most of the down stream enterprises will also expand capacity or implement new projects. Total investment costs for this expansion will be around 1 billion US dollars, of which 400 million US dollars will be allocated to the central cracking unit Copene and 600 million US dollars to second generation firms.[49] In 1989 several projects had already been approved by the CDI. More details concerning this expansion will be provided in chapter 5.[50]
- Finally, in Rio de Janeiro a complete new complex will be created, based on gas as feedstock. In August 1986 President Sarney signed the decree declaring the establishment of a new petrochemical complex in the state of Rio de Janeiro. Construction was expected to begin in December 1988 and the start of production was projected for 1992.[51] Due to economic and political constraints[52] the construction of the Rio complex was delayed to such extent that in 1989 several entrepreneurs wondered whether the complex would be realised at all. A common expression that could be heard was: "Complexo do Rio? Ano dos mil!" (Rio Complex? year two thousand!) In fact only the exact location of the new complex was known in 1989. Extended discussions resulted in the choice of Itaguaï as the optimum site.

Figure 3.8. Petrochemical projects approved by the CDI in 1987



source: Annual report ABIQUIM, 1987

Total investments for the new complex in Rio de Janeiro will be around 2 billion US dollars, of which 820 million US dollars will be used to construct the central cracking unit and the remaining amount will be used to establish the downstream enterprises.[53] The director of the coordinating committee, the COPPERJ,[54] Rodrigo Lopez, remarked that despite all delays many firms expressed interest in investing in the future complex. Among the enterprises that are interested, are some of the largest petrochemical producers: the list of applying firms included 19 national groups and 23 foreign enterprises.[55]

3.7. Shift from petrochemicals to fine chemicals

Up to this point in the chapter special emphasis has been placed on the role of the petrochemical branch within the chemical sector of Brazil. One aspect of the development of the chemical sector that is of significance for the petrochemical sector is the shift from petrochemicals to fine chemicals. All over the world petrochemical companies are turning their investments in the production of basic and intermediary chemicals into investments in the production of fine chemicals, because it is more profitable to invest in activities closer to the consumer that have a large growth potential. Especially industrial branches with a relative high level of product technology are becoming more attractive. An example is the production of

pharmaceuticals, a product close to the consumer with high internal returns and relatively low investment costs.

Brazil is no exception and also in this country this shift can be observed. For decades the Brazilian fine chemical industry was dominated by transnational companies, but at the end of the eighties national entrepreneurs also began to invest in this sub-branch. The large profitability of the fine chemical branch was one of the most important stimuli for its national development. Strategic arguments provided another stimulus. From the point of view of the Brazilian government the under-representation of national enterprises in this branch was not only a severe limit on national development of the chemical sector as a whole, but it could also make the country very vulnerable in times of war; Brazil must be able to provide its own medicine. One lesson from the Falkland war between Argentine and Great Britain was that a country can become dependent and vulnerable if it does not have its own pharmaceutical firms.[56] Finally, before the PNP was designed, further expansion in the petrochemical industry was not possible. The capacities of the central cracking units were insufficient to cope with enlarged production of the downstream enterprises. Therefore, the solution to the idle investment capacity of the entrepreneurs of the downstream petrochemical companies was to invest capital in another chemical branch: the fine chemical industry.

The increased interest in the fine chemical sub-branch in particular can clearly be seen in the development of the investments between 1965 and 1981 (see table 3.3.). In the period 1965-1970 total investments were only 9.7 million US dollars; in the period 1975-1981 they increased to 381.6 million US dollars.

Table 3.3. CDI approvals for investments in fine chemicals in the period between 1965 and 1981 in number of projects and investments in million US dollars in Brazil

	1965-1970	1971-1975	1975-1981	total
number of projects				
national projects	4	6	20	30
foreign projects	12	34	13	63
total number	16	40	37	93
investments million US $				
national projects	0.7	13.6	111.1	125.4
foreign projects	9.0	48.6	270.5	328.1
total number	9.7	62.2	381.6	453.5

source: Suarez, 1986

Logically, most of the firms investing in the fine chemical branch originated from the petrochemical branch. Two factors contributing to this phenomenon were the former experience with chemical production and the availability of relatively large financial reserves that could be reinvested. In some cases investments in the fine chemical branch were made by entrepreneurs who owned petrochemical firms but wanted to expand their business. However, entrepreneurs also sold their shares in the petrochemical branch and bought shares in the fine chemical branch. Transnational corporations in particular were selling shares of petrochemicals companies in order to buy shares in fine chemical firms. According to Suarez, several foreign entrepreneurs in the Camaçari complex decided to leave petrochemical production and to concentrate their activities on fine chemicals:

> "Obviously, the transnationals do not leave their participation because of nationalistic emancipation. In all four cases, their shares were sold at 'gold prices' to generate the necessary resources for the migration to fine chemicals".[57]

3.8. Summary and conclusions

The development of the Brazilian petrochemical industry has been influenced by large fluctuations in demand figures, high expectations and ambitious expansion programmes. During the last two decades these were responsible for an impressive increase in national petrochemical production that brought Brazil to the 11th place in the ranking of petrochemical world producers. During the Brazilian economic miracle, from 1967 to 1973, the impressive growth in the GNP resulted in an enormous increase in the demand for petrochemicals. The production capacity of the already existing petrochemical firms in the state of São Paulo did not prove to be sufficient to satisfy the demand. Therefore, extended discussions were held during the first years of the seventies on how to expand petrochemical production. These discussions resulted in the design of a new petrochemical complex in the northeastern state of Bahia; the Camaçari complex. Because of high expectations for the development in demand for petrochemicals at that time, shortly after the construction of the Camaçari complex had started a new petrochemical complex was planned, this time in the southern state of Rio Grande do Sul. The new complex became known as the Polosul.

Both complexes experienced a difficult start, however, due to the fact that between the first plans to construct a new complex and the moment that this complex finally began production a period of at least five years passed by. When the Camaçari complex came on stream in 1979 Brazil was still experiencing serious repercussions of the first oil crisis in 1973. The decline in internal demand for petrochemical products, resulting from this oil crisis, could, however, be solved by exporting part of the product. When the Rio Grande do Sul complex started to produce in 1982, the economic situation of Brazil had deteriorated even more due to the second oil

shock in 1979. This time it proved to be difficult to solve the problem of oversupply by exporting petrochemicals: international demand was too low to guarantee reasonable prices. Although Polosul, supported by government export subsidies, became the largest exporter of all the petrochemical complexes, several downstream projects were never realised.

During the second half of the eighties prospects for petrochemical production improved noticeably. Internal demand increased and international prices started to rise. It was in this period that the foundation was laid for the National Petrochemical Programme, the PNP. In this programme the expansion of the petrochemical industry of Brazil was outlined, consisting of the creation of a new complex near Rio de Janeiro and the extension of the Camaçari complex. The other two complexes, São Paulo and Polosul, were allowed to modernise and to increase their production slightly.

Despite the fluctuating profits of the petrochemical industry during the last two decades, the overall trend has been positive. Nevertheless, several entrepreneurs shifted the emphasis of their production to a chemical sector that they expected to be more profitable: the fine chemical sector.

Notes chapter three

1. Marcus Alban Suarez investigated the petrochemical technocracy in the petrochemical complex of Camaçari which resulted in the 1986 publication: "Petroquimica e technoburocracia, capitulos de desenvolvimento capitalista no Brasil", editora Hucitec, São Paulo, 1986, p 32.
2. Gazeta Mercantil, 1988.
3. Mascarenhas, J.F., Introdução a petroquimica, Petroleo e Petroquimica, 8/9 (3-15) p 4, 1972.
4. Interview Director President Rhodia, São Paulo, June 1989.
5. Marcus Alban Suarez, 1986, p 32.
6. Hagenauer, L., O complexo quimico Brasileiro, organisação e dinamica interno, Universidade Federal de Rio de Janeiro, Rio de Janeiro, 1986, p 81.
7. Ibid., p 81.
8. Teixeira, The political economy of technological learning in the Brazilian Petrochemical industry, PhD Thesis, University 1985, p 56.
9. In an integrated petrochemical complex all three generations are present in an interrelated form.
10. Production capacity in the petrochemical industry is usually measured in ethylene capacity.
11. Teixeira, 1985, p 54.
12. Tercer Congresso Brasileiro de Petroquimica, Quimica e derivados, september 1984, p 24.
13. Hasenclever, L. "Desempenho da industria petroquimica Brasileira na decada de 80" 4 Congresso Brasileiro de Petroquimica, otubro 1988, Rio de Janeiro, (1-13) p 5.
14. The CIP is the 'Conselho Interministerial de Preços', erected in 1968 and coordinating the control of all kinds of prices.
15. Dirigente Industrial, Falta de materias primas pode trazer problemas, p 35, Janeiro 1986.
16. Petro & Quimica, Setor Petroquimico apresentou desempenho muito bom em 1985, november 1985, (17-30) p 18.
17. Veja, Hora de decisão na petroquimica, May 1989, (128-134), p 129.
18. Hagenauer, L., 1986, p 43.
19. Somers, J.P. Competatividade da industria quimica X capacidade de exportar. Petro & gas, December 1986, (4-17) p 14.
20. In order to deal with the very high inflation rate of Brazil in 1986 and 1987, the government implemented two economic transformation programmes; the so-called Cruzado plans. The measures taken included, amongst others, a freeze in prices of almost all products, and a restrictive policy concerning salary increases.
21. Hasenclever, L. 1988, p 7.
22. Figueredo, Juca: baixa rentabilidade enfraquece petroquimica, Jornal de plasticos, May 1987, (2-4), p 2.
23. C. R. Frischtak, petroquimica e industrialização no Brasil, Seminario International de Industrial Petroquimica, July 1988, (1-11) p 2.
24. Baccaro, A. M. O balanco dos polos, Quimica e Derivados, April 1983, (8-40) p 8.
25. Gazeta mercantil, 1987.
26. With the exception of a period of five years, 1949-1950, Vargas was the president of Brazil from 1937 till he committed suicide in 1954.
27. With CNP the Conseilho Nacional de Petroleo is meant which was created in 1938, Suarez, 1986, p 65.
28. Suarez, M. A. 1986.
29. BEICIP: Bureau des Estudes Industrielles et de Cooperacion, which belongs to the French Oil Institute.
30. Teixeira, F., 1985, p 56.
31. Suarez, M. A. 1986, p 160.
32. Suarez, M. A. 1986, p 163.
33. Quimica e Derivados, Anna Maria Baccaro, O balanco dos polos, April 1983, (8-40) p 9.
34. Gazeta Mercantil, 29-1-1987.
35. Interview with former executive director of the working committee of the installation

of the petrochemical complex in Triunfo, 1988.

36. Quimica e Derivados, 1985.
37. Interview Director Copesul, Porto Alerge, April, 1988.
38. Quimica e derivados, 1987, pp 9-42.
39. Gazeta mercantil, 29-1-1987.
40. Dirigente Industrial, 1988, p 33.
41. Michael Hartveld is one of the directors of both the state company PqU and the national private company UNIPAR. In chapter 4.4.1. the role of Hartveld will be discussed in more detail.
42. Gazeta Mercantil, 29-1-1987.
43. Baccaro, A. M. 1983, p 20.
44. The output of a central cracking unit consists of a range of products that are arranged in a fixed division. It is therefore not possible to increase the output quantity of one intermediary good without simultaneously increasing the output quantity of the other intermediaries.
45. Baccaro, A. M., 1986, pp 14-29.
46. Gazeta Mercantil, 29-1-1987.
47. Ibid.
48. Ibid.
59. Quimica e Derivados, 1987, p 30.
50. Gazeta Mercantil, 29-1-1987.
51. Quimica e derivados, 1987, pp 9-42.
52. A political reason was that the governor of Rio de Janeiro, Moreiro Franco, did not support president Sarney in his wish to prolong its governmental period to five years, instead of four years. So while Franco in 1988 still was quite sure of government support for its plans to construct the petrochemical complex in Rio, in 1989 all good will seemed to be gone. Another political reason could be found in the rather unstable situation in Brazil, at the end of 1989. Elections were due and no one could guess what was about to happen. An economic reason was the difficult economic situation Brazil found at that moment. Inflation skyrocketed and successive economic stabilisation plans had in fact a rather negative effect on the Brazilian economy.
53. Gazeta Mercantil, 29-1-1987.
54. COPPERJ: Companhia de Polo Petroquimico do Estado de Rio de Janeiro.
55. Porto e Navios, 1987, p 23.
56. In an interview, an employee of FINEP remarked that during the Falkland war the production of penicillin was threatened to be diminished by western companies, Rio de Janeiro, May 1988.
57. Suarez, M.A. 1986, p 196.

4

THE IMPORTANCE OF THE TRIPARTITE MODEL IN THE PETROCHEMICAL INDUSTRY IN BRAZIL

4.1. Introduction

In the previous chapter the development of the Brazilian petrochemical industry was outlined. The remarkable growth figures for petrochemical production and the impressive change in the balance of trade of the petrochemical industry were partly explained by the creation of three petrochemical complexes. But it is interesting to ask how the Brazilian petrochemical industry managed to consolidate its growth figures despite severe economic recessions and two oil-shocks, and how it managed exporting a considerable part of its total production. Why did petrochemical complexes in other Latin American countries, such as Bahia Blanca[1] complex in Argentine, fail while the Brazilian petrochemical complexes flourished?

As described in chapter 2, Evans analyses the development in the Brazilian petrochemical industry using the constellation of the triple alliance.[2] In chapter 2, the ways in which the alliance between state capital, multinational capital and national private capital has shaped industrial development in several underdeveloped countries and has stimulated national capital accumulation, were described. In Brazil, the government, together with representatives of the private sector, decided to use the triple alliance as a development model for the petrochemical industry and in this way created the tripartite model. In this chapter, this model and the way it was implemented in the Brazilian petrochemical industry, will be discussed into more detail.

The first petrochemical complex developed in São Paulo during the sixties and was largely dominated by foreign firms. At the end of the decade, when the petrochemical entrepreneurs began looking for expansion possibilities, this foreign dominance came under attack and debate developed over the entrepreneurial model that should be used in future expansions. Although both the state bureaucracy and the private national entrepreneurs wanted to reduce the foreign presence in the petrochemical industry, alternatives with less of a foreign presence were not that easy to find. A totally state-owned complex was out of the question: the state would lose it legitimacy with respect to the national bourgeoisie. In addition a totally national private complex was impossible simply because local technological knowledge was insufficient. With the construction of the Camaçari complex, a solution to this problem was found in the form of the tripartite model. Different aspects of this tripartite model, government aims and the way it was implemented will be described in section 4.2.

Within the tripartite model, the three partners of the triple alliance are linked in a

formal way and form the so-called tripartite joint ventures. In this chapter, the respective roles of these three partners will be described. First, in section 4.3., the changing role of the various state institutions will be dealt with. After a brief description of the creation of important state institutions, their changing influence in the petrochemical industry will be outlined. A distinction will be made between state technocratic institutions such as the National Development Bank, BNDES, and the ministerial-linked industrial council CDI; and state enterprises such as Petrobras and Petroquisa.

Before the tripartite model was implemented, few entrepreneurs of Brazilian origin invested in the petrochemical industry. With the construction of the Camaçari complex this changed and several, regionally based entrepreneurs started to invest in this sector. In this chapter, they are called the non-sector-related petrochemical entrepreneurs. Unlike sector-related entrepreneurs, non-sector-related entrepreneurs did not originate initially from the chemical sector, for instance, the petroleum branch or the plastic branch, but from other industrial or even service sectors. The difference in attitude, the internal relations and the relative power distinguishing these two types of entrepreneurs are of importance for the functioning of the tripartite model. The formal and informal relations of the national petrochemical bourgeoisie are described in section 4.3.

The third partner in the tripartite model is the foreign corporation. Almost all chemical transnationals in the world are represented in the Brazilian petrochemical industry. In section 4.5., a brief description will be given of the four most important foreign participants in the Brazilian petrochemical industry and their role in the tripartite model. First, the strategy of Dow Chemical, an American petrochemical conglomerate that tried to stay out of the tripartite model as long as possible, will be described. Second, Shell, an Anglo-Dutch transnational that wanted to participate in the tripartite model only when certain conditions were met. Third, the position of the French Rhone Poulenc, which participated early in the tripartite model but changed its mind after a couple of years is presented. Finally, the case of the Japanese Mitsubishi, which probably would not be present in Brazil if the tripartite model had not been used, will be explained.

4.2. The creation of the tripartite model

As described in the previous chapter, the development of the Brazilian petrochemical industry can be divided into four stages, corresponding with the three existing petrochemical complexes and the complex, which is planned. Before it became official government policy, during the first and the second stage of development, the tripartite model was subject to lengthy discussions at several chemical and petrochemical congresses. In the following paragraph this process will be discussed.

4.2.1. The first tripartite firms in São Paulo

The first step toward the tripartite model was taken when joint ventures between national and foreign firms were formed in the São Paulo complex. One of the projects in the complex, which was briefly described in the previous chapter, was created by a joint venture: the national company Capuava joined with the American Phillips Petroleum. In a later stage two more national partners entered the ethylene-producing company. The incentive for the tripartite joint venture can be found in severe financial problems. The profit margins of the company were too low to repay the start-up costs and a large number of additional investments was needed to complete the project. These problems forced Phillips Petroleum to sell its shares to another firm. No single firm could be found that was able to buy the shares, however, and a considerable loss threatened the company. Because the Brazilian state considered the petrochemical sector to be of strategic importance, the solution was found in state participation. Thus, the state-owned oil company, Petrobras, decided to buy all shares of Phillips Petroleum. The only problem was that a state firm was not allowed to participate in a firm on a minority basis. As a result, a new juridical construction was needed. In 1968 Petrobras created a 100% subsidiary, Petroquisa, which was not restricted by this clause. Petroquisa could participate on a minority basis in any firm.

As a result, a completely new joint venture with three partners was created. The first partner was Petroquisa, the second included two national private alliances; the one consisting of the Capuava Group, Moreiro Sales and Hanna mining company, named UNIPAR, and the other one was formed by the Ultra Group, belonging to the Igel family. A conglomerate of foreign financial institutions, including the International Finance Corporation (IFC) together with a group of French banks, participated as the third party. The financial institutions were invited in order to solve the continuing financial problems. The participation of the state increased considerably when the UNIPAR group had to sell most of its shares to Petroquisa due to financial problems. After this transaction Petroquisa possessed 75% of all shares.[3] Thus, at the end of the sixties, the first tripartite joint venture firm in the history of the Brazilian petrochemical branch was a fact. Marcus Alban Suarez, who concentrated his comprehensive study on the involvement of the state technocracy, posed:

> "In this way the main lines were drawn of a tripartite model consisting of an association between local private, state and multinational capital by means of a combination of assets to form independent companies."[4]

The tripartite firm, named Petroquimica Uniou (PqU), became the central cracking unit of the petrochemical complex of São Paulo. After the initial success of this entrepreneurial model in the PqU firm, the same model was utilized in several of the second generation firms in São Paulo. For example, the state firm Petroquisa participated in the firm Poliolefinas, together with the US-based transnational corporation, National Distillers, the IFC and a national partner. Another second generation tripartite firm was Polibrasil, a conglomerate of Shell, Petroquisa and a

national partner. Finally, in the São Paulo region Oxiteno was created, a tripartite joint venture between Scientific Design, Petroquisa and the Brazilian Grupo Ultra.

4.2.2. Conflicting interests converted into a model: Camaçari

At the end of the sixties the second stage of the petrochemical development in Brazil began and the petrochemical industry sought expansion possibilities. Lengthy discussions took place in which the main issue was whether to choose an entrepreneurial model in these expansions. On the one hand, the already established entrepreneurs in São Paulo preferred the expansion of the existing petrochemical firms in their region. In the São Paulo complex various distinct ownership structures can be found: tripartite companies, 100% foreign firms and joint ventures between foreign and national firms. On the other hand, the state institutions of Bahia, supported by the techno-bureaucrats of Petrobras and the National Development Bank the BNDES, promoted the idea of a completely new complex in Camaçari in which the ownership structure would be different from that of São Paulo. Although this alternative would be more costly, it provided an opportunity to diminish the absolute foreign domination in the petrochemical industry.

It proved difficult, however, to decide which entrepreneurial model should be used. A state monopoly in the petrochemical industry was out of the question: firstly, because of the lack of up-to-date nationally owned technology and, secondly, because of significant opposition from the national private entrepreneurs. A completely state-owned petrochemical complex would seriously threaten the legitimacy of the state with respect to local entrepreneurs. If involvement of the state in the productive sphere were to exceed certain limits, severe opposition from national entrepreneurs could be expected. A second option was a completely foreign-owned complex. This was not feasible, however, because of strong nationalist tendencies: national private as well as technocratic interests eliminated this possibility. A third option was to design a complex that was fully owned by private national entrepreneurs. This was not seen as a viable option either, since the national petrochemical industry possessed limited technological capability. In addition, a lack of capital prevented the national entrepreneurs from constructing a complex on their own. The establishment of joint ventures was seen as a fourth option. Since none of the three parties involved wanted to lose interest in the petrochemical industry, joint ventures in which all three participated would be the best entrepreneurial model for the Camaçari complex. Moreover, the positive results of the tripartite joint ventures in São Paulo gave the Brazilian government the idea that this model could perfectly function in the Camaçari complex as well.

The merits of the tripartite model could be found in the fact that all three participating enterprises, in one way or another, would benefit from participation. The advantages for state and national enterprises of inviting transnational corporations to participate in petrochemical tripartite joint ventures were obvious: national firms could obtain access to foreign technology as well as to foreign capital. Another

advantage was that the national firms could benefit from the management expertise of transnational corporations and could profit from their strong market position and export opportunities. It was also beneficial for the transnational corporations to participate in a tripartite joint venture. For them, access to raw materials, which were monopolised by the state, increased. State participation increased, furthermore, the confidence of the foreign firms that the relatively small and unknown national partners would keep their promises in the joint venture. A very important advantage was that, by participating in a joint venture structure, foreign firms could obtain access to financial incentives and local financing sources otherwise not available to transnational corporations. And last, but certainly not least, the political influence of foreign firms increased, which fostered goodwill.

4.2.3. Government aims in the implementation of the tripartite model

The government decided that all downstream enterprises should apply the tripartite model, which meant that all partners would receive one third of the voting shares. In order to guarantee the tripartite structure a number of criteria were set. One of the regulations was that Petroquisa could not participate with a smaller share than the largest private partner. Another was that no single partner would be allowed to possess the majority of the shares.[5] In this way, a private majority could always be formed to influence decisions of the state partner and, likewise, a nationalist majority could always be formed to influence decisions made by the foreign partner. The state was guaranteed control and meanwhile the supply of technology was secured. Furthermore, the interests of national private entrepreneurs were not neglected.

Although no explicit government aims were defined when the tripartite model was implemented in the Camaçari complex, a number of implicit objectives existed. Import substitution was the first and most important goal of the Brazilian government. To satisfy the rising internal demand for petrochemicals without disturbing the petrochemical balance of trade, required a considerable increase in national petrochemical production.

> "In the following phase of the Brazilian petrochemical industry there was an almost exclusive concern with import substitution, especially in the creation of a local production capacity. (-) At that time, the only aim of the industry was to substitute imports of intermediate or final products".[6]

Secondly, the government wanted to stimulate the creation of a nationally controlled petrochemical industry that was not dominated by foreign enterprises. With the application of the tripartite model, a national majority was always secured.[7] The third objective, implicit in the implementation of the Camaçari complex but more explicitly stated when the third complex was created, was the transfer of technology. Since foreign technology suppliers participated directly in the joint ventures, bringing with them the most up-to-date technology, it was assumed that a smooth process of technology transfer would occur.[8] A fourth important objective, which is

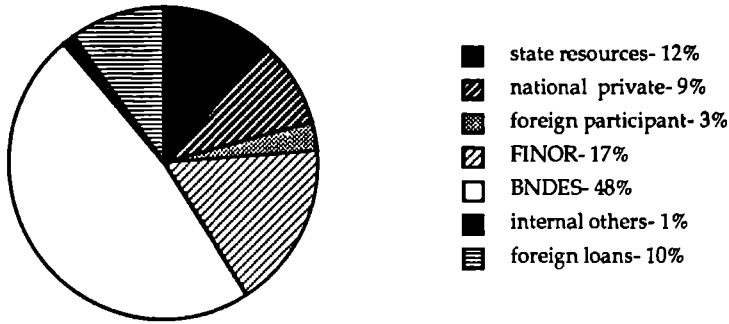
related to the previous one, was the creation of a strong national petrochemical enterprise system.[9] Due to the relatively recent development of the Brazilian petrochemical industry and the domination of foreign enterprises in the sixties and seventies, national private petrochemical firms were scarce in Brazil. With the implementation of the tripartite model the knowledge and experience of transnational firms would be transferred to national participants who formerly had not been interested in the petrochemical industry, thus creating a new group of national petrochemical producers. Moreover, the involvement of a group of regional entrepreneurs, originating from other sectors, would enlarge the number of petrochemical entrepreneurs in the country. Finally, regional development could be seen as one of the more state-supported objectives. Evans remarks, in this respect, that:

> "Brazil was attempting not just to build a petrochemical complex, but to plant a dynamic industrial pole in an area where less extreme attempts to create industrialisation did not seem to have worked. The Camaçari pole was an ambitious attempt at the kind of linkage-generating strategy of 'unbalanced growth' that Albert Hirschmann might have suggested."[10]

Once government policy and objectives were clearly defined and construction plans for the complex had been developed, negotiations with firms wishing to participate could begin. The Ministry of Industry and Commerce (MIC) determined which projects could be constructed on the complex as well as the products they should produce. Firms that were interested could apply for participation. After extensive negotiation and harsh competition, 20 projects were formed in 1975: twelve tripartite joint ventures, five bipartite joint ventures and three 100% owned companies. In the majority of cases, the transnational corporations brought in the technology with an equivalent value of 10-12% of the shares. The small contribution of foreign firms in terms of finance capital can be seen in figure 4.1. Nevertheless, according to the regulations, they received one third of the voting shares.[11] The national partner contributed approximately 9% of the total investment costs and received, like the other partners, a third of all shares in return. It is clear that most of the invested capital came from other resources. Although Petroquisa provided a relatively large part of the finance capital, most capital was obtained from the development programme for the northeast: FINOR,[12] and from credits supplied under very favourable conditions by the National Development Bank BNDES. Both national and international firms benefited from this government policy to stimulate the petrochemical industry by providing the financial means. In chapter 5, the investment structure of the Camaçari complex will be described in more detail.

Though in most of the downstream enterprises the tripartite model was used, the central cracking unit, Copene, had a somewhat different structure. The state enterprise Petroquisa owned 51% and the 17 joint venture enterprises that were constructed in the initial period of the complex owned 49%. Despite the fact that all three partners in the tripartite model were indirectly represented in the central cracking unit, during the first period most influence was exercised by Petroquisa, until Copene was privatised in 1980.

Figure 4.1. Financial resources used at the start of the Camaçari petrochemical complex, in 1977, in percentages



source: Suarez, 1985

During the third stage of development of the petrochemical industry in Brazil, when the Triunfo petrochemical complex was constructed, the tripartite model was again used as the dominant entrepreneurial model. This time, in contrast to the Camaçari complex, an attempt was made to increase the share of national private capital.[13] Since the petrochemical and petroleum industry did not play a very important role in Rio Grande do Sul before the petrochemical complex was constructed, and given the lack of technological know how and the lack of financial resources on the part of the national enterprises, it was impossible for the national local entrepreneurs to play a leading role. More or less on request of the national partners, a decision was made to use the tripartite model once again. The regulation that each partner should possess one third of the voting shares was applied less strictly, however. Thus, five of the six enterprises constructed in Triunfo were established in accordance with the tripartite model.

With the construction of the Camaçari and the Triunfo complexes, state capital, private national capital and foreign capital became equally involved in the petrochemical industry. The role of the petrochemical technocracy in particular is worth mentioning; the two private partners also played an important role. The contribution of all three partners was, however, subject to certain fluctuations.

4.3. The changing contribution of the state to the petrochemical industry

4.3.1. The creation of state institutions

Within the tripartite model, the state played a decisive role. The first step in the direction of state involvement in the petrochemical sector was taken in 1938 when the National Petroleum Council, (CNP) the government institution responsible for petroleum policy, was created. At the end of the forties, the CNP launched a nationalist campaign to stimulate the national development of petroleum exploration and refinery, using the slogan: 'O petroléo e nosso' (the oil is ours). This campaign resulted in the creation of the state oil company, Petrobras, in 1953, which is among the one hundred largest companies in the world.[14]

During the fifties, the state companies of Brazil further enlarged their influence. As part of President Kubitschek's (1956-1960) 'Programa de Metas', investments in state enterprises increased. Since the government emphasised the development of the durable consumer goods sector in that particular period, the petrochemical industry did not receive the impulse it needed for large scale development.

The ambitious government plans to generate autonomous growth in Brazil resulted in an economic crisis, however and while escalating inflation and an increasing foreign debt afflicted the country, the government retreated. The government of Goulart[15] heavily restricted government spending and, consequently, investments in state enterprises declined. Nevertheless, this was not sufficient to solve the huge problems Brazil was facing.

After the military coup d'etat of 1964, the populist alliance was replaced by an alliance of amongst others state technocracy and representatives of transnational enterprises. In order to increase the efficiency of the industrial sector, a denationalisation campaign evolved and the importance of transnational capital increased. Suarez remarks in this respect:

> "The new military government maintained, in this form, the integration of an economic development model that, because of the incapability of local industrial bourgeoisie, privileged multinational capital and limited the function of the state firms to support the private accumulation."[16]

The military government was supported by several state institutions that were created directly after the coup. The creation of these institutions was an important stimulus in the development of the petrochemical industry. The most important institution, which was created in the very same year that the coup took place, was the Industrial Development Council (CDI). The CDI was subordinated to the Ministry of Industry and Commerce (MIC) and its main objective was to stimulate industrial activities by private firms. After its creation, all industrial projects needed CDI approval before construction could begin.[17]

An institution, also established in 1964, that made a significant contribution to the growth of the petrochemical sector was the GEIQUIM: 'Executive Group for the Chemical Industry', later changed into the 'Executive Group III' (GS III). This

institution represented several ministries: the Ministry of Industry and Commerce, the Ministry of Agriculture, the Ministry of Mining and several banks.[18] The tasks of the GS III were limited to the chemical sector: all petrochemical projects had to be approved by the GS III before they were allowed to obtain financal or fiscal incentives.

The third state institution that played an important role in the development of the petrochemical industry in particular, was the National Development Bank, BNDE (Banco Nacional de Desenvolvimento Economico). Founded in 1953, long before the coup d'Etat, the BNDE's objective was to support economic growth by financing projects it considered of great importance. In the sixties the 'S' of Social was added to the abbreviation in the name of the development bank; from then on the BNDES also financed more social-economic projects and was not restricted to purely economic projects alone.

In 1965 the BNDE acknowledged the importance of a national petrochemical industry and investigated the possibilities for the development of such an industry in Brazil. In that year, the Bank published a document, titled: "Perspectiva da participação do BNDE no financiamento da industria quimica." (Perspectives of the participation of the BNDE in the financing of the chemical industry).[19] Based on the conclusions of this document, and in cooperation with the state enterprise Petrobras, the BNDE decided to establish a "cooperation programme BNDE/Petrobras, for the development of the petrochemical industry, by means of specific projects that were recommended by Petrobras and financed by the BNDE".[20] Various opportunities existed to obtain a BNDE loan but acceptance of a project always depended on approval from the CDI. Real interest rates were low, between 4 and 6%, and the amortisation period was between 4 and 15 years. To provide technical assistance the BNDE created the FUNTEC, which had to support technological scientific research in the country, as well as be a center for the formation and training of human resources on the graduate and post-graduate level.[21]

The focus on state institutions for the purpose of stimulating private initiative did not mean that the military rulers paid less attention to the development of state enterprises. Evans states:

> "A greater role for state enterprises was quite consistent with the military's general strategy of increasing political and economic centralisation. Instead of diminishing under the military, the number of state enterprises increased more rapidly than in any previous era."[22]

Petroquisa was one of these state enterprises that played a decisive role in the Brazilian petrochemical industry. Created in 1968 as a 100% subsidiary of Petrobras, Petroquisa enabled minority participation of the state in national and even foreign joint ventures.

4.3.2. Specific nature of the state technocracy

At the end of the sixties and the beginning of the seventies, the various state institutions and petrochemical state enterprises together formed the so-called petrochemical technocracy. This petrochemical technocracy was characterised by the relatively strong linkages that existed between the various institutions. One of these linkages was formed by the already mentioned 'working group', consisting of the BNDES and Petrobras. Several linkages between CDI and BNDES were of importance as well: the BNDES participated, for example, in the executive council of the CDI. Linkages between these institutions were reinforced by the regular exchange of executive officials between the different institutions.[23]

The fact that the petrochemical technocracy stimulated the development of the petrochemical industry to such a large extent was mainly due to the specific nature of these institutions. Nunes and Geddes speak of insulated bureaucracies:

> "By referring to bureaucratic agencies as insulated, we do not imply that they are cut off from all outside influences and free from party politics; we mean rather that although information and resources flow between an insulated agency and its environment, the agency is able to maintain its organisational integrity and to pursue its own goals. The insulated bureaucracy includes some of the state enterprises, some state controlled banks as the BNDES, the executive groups -in short many, though certainly not all - of the state agencies outside the traditional federal bureaucracy".[24]

According to their opinion, employees in these insulated bureaucracies possessed more specific knowledge and clientilist practices were unknown. This was the main reason for the efficient functioning of these institutions, which resulted in increased government intervention in the industrial sector in general and the petrochemical branch in particular.

Evans also stresses the managerial capacities of the Petrobras technocratic staff:

> "Petrobras is known in the industry as a 'school for petrochemical management'. The Brazilians it has trained not only staff its own operations, but also fill important positions in the private sector, where there is a heavy demand for competent Brazilian executives."(-) "Petrobras and Petroquisa personnel are recognised as having a 'strong profit orientation'. The technical competence of the state managers is also recognized by their private sector counterparts."[25]

Suarez is of the opinion that the specific characteristics of the technocrats participating in the petrochemical industry, provided a strong stimulus to petrochemical development. However, he mentions two further factors that he considers to be of great importance for the successful role of the petrochemical technocracy.

First, the autonomy of state companies increased significantly in the early seventies. This is not exclusively the case in the petrochemical and petroleum branch but took place in the productive industrial sector as a whole. The person responsible for this change is Helio Beltrão, who replaced the liberal Roberto Campos as Minister of Planning at the end of the sixties.

"Apparently only a simple swap of names, but in reality this fact represented a significant transformation in the economic policy of the government. (-) By his 'administrative reform' he assured the productive state sector and its techno-bureaucracy an autonomy that till that moment did not exist."[26]

Beltrão had been director of the National Petroleum Council and had played an important role in the creation of Petrobras.

The second important factor was the choice of Ernesto Geisel in 1969, who had been minister of the Higher Military Court, as president director of Petrobras, a position he would occupy until 1974.[27] In order to reorganise Petrobras and change it into a more efficient institution he liberalised financial control and changed the upper echelons of the staff.[28] This strategy resulted in the increased autonomy of Petrobras. In his policy Geisel concentrated on the most lucrative petroleum activities and on the stimulation of the petrochemical industry. The autonomy of Petrobras was further increased when Geisel concentrated more on his future political career -he was to become president of the republic in 1974- giving Petrobras an opportunity to define its own strategy.

4.3.3. Relations between petrochemical technocracy and Bahian state bureaucracy: increasing influence of the state

Not only linkages between members of the petrochemical technocracy were of importance for the development of the petrochemical industry in Brazil. The existing linkages between the petrochemical technocracy and the bureaucracy of the state Bahia also played a decisive role. Some experience in the chemical sector existed in the north-eastern state of Bahia before the Camaçari complex was constructed: it was the most important oil-producing state and possessed a large oil refinery, the RLAM[29]. Not surprisingly this state tried to establish the second petrochemical complex within its borders. An important person in the formulation and realisation of the Bahian initiative was Romulo Almeida: director of a consultant agency CLAN[30]. In 1969, CLAN was asked by the state administrators of Bahia to conduct a feasibility study regarding the possibilities for establishing a Bahian petrochemical complex. This research, financed by the federal government, and executed in cooperation with some important members of the petrochemical technocracy, such as Paulo Bellotti of the BNDES and Otto Perroni of Petrobras, resulted in the publication of a document titled: "Desenvolvimento da industria petroquimica no estado de Bahia" (Development of the petrochemical industry in the state of Bahia).

The petrochemical technocrats saw in the initiative of the state Bahia an important opportunity for increasing their strength and influence in Brazil's petrochemical industry. They feared a declining influence in the profitable petrochemical industry if the federal government were to give preference to the expansion of existing firms in São Paulo. Private national and multinational interests in the enterprises situated in the São Paulo region were relatively long established and it would be difficult for state enterprises to enlarge their influence there.[31] The important linkages that

developed between the petrochemical technocracy and the Bahian supporters resulted in the 1971 decision of the MIC to create a 'working group for the petrochemical complex in Bahia'. This working group asked the French research institute BEICIP to investigate the possibilities for petrochemical production in the Bahian region. The positive recommendations of the BEICIP provided the take off for the construction of the petrochemical complex in the state Bahia.

The decision to locate the new complex in this state strengthened the position of the petrochemical technocracy; not only because half of the central cracking unit was owned by Petroquisa, but above all because the application of the tripartite model gave Petroquisa one third of the voting shares of all seventeen downstream enterprises on the complex.

Before Geisel became president in 1974 the petrochemical technocracy could maintain its autonomous position rather well. This situation apparently changed somewhat when Geisel implemented the Second National Development Plan (PND II), with the objective of consolidating growth figures at the same level as those reached during the Brazilian miracle. One of the most important means to do this was strengthening the national bourgeoisie since it was considered a weak element in the tripartite alliance. Various institutions of the BNDES were created to supply the national bourgeoisie with financial means and to provide incentives for technological development. Although this policy did not diminish the importance of state enterprises, it placed greater emphasis on private national companies than before. This change became clearly visible when the third petrochemical complex was constructed in Triunfo. Petroquisa was prepared to decrease its shares in favour of private interests in this complex. Instead, the rather small regional groups that planned to participate in the complex asked Petroquisa to support them in tripartite joint ventures, in the same way that Camaçari had been implemented. When the Triunfo complex started production in the beginning of the eighties, Petroquisa participated in the five new downstream projects of the Triunfo complex and owned 47.22% of the central cracking unit, Copesul. As a result, the influence of Petroquisa in the petrochemical industry increased rather than decreased.

4.3.4. The changing role of Petroquisa

Not everyone was satisfied with the heavy involvement of the state technocracy in petrochemical production. During the eighties complaints could increasingly be heard with respect to restrictions imposed upon petrochemical firms. In 1986 and 1987 the participation of the state in the petrochemical industry was extensively discussed in the preparations of the National Petrochemical Programme, PNP, for example, during a petrochemical congress[32] held in Salvador, the capital of Bahia. Thomas Unger[33] remarks that state vigilance in the petrochemical branch was so overbearing that it was almost impossible for firms to make their own decisions. They were too dependent on the state and their flexibility to react to external developments was limited.[34] Some of the national petrochemical entrepreneurs

preferred that the state withdraw from activities that could better be confined to the private sector. In particular, private enterprises desired a larger role in the expansion of existing firms and in new firms. But, since the Brazilian government needs the dividends generated by the profitable petrochemical industry, it is unlikely that it will voluntarily decrease its participation in the near future. In 1985 the director of Petroquisa, José Juca Neto stated in an interview with the magazine Petro & Quimica:

"We believe that the withdrawal of the government from the petrochemical enterprises will result in negative figures for these enterprises."[35]

He further declared that Petroquisa had acted in the past and will continue to act in the future as an arbiter between the national private partner and the foreign partner. Without this intermediary, the joint ventures would almost certainly end in failure. An indication of the increasing involvement of Petroquisa in the petrochemical industry is the joint venture Petroquimico Triunfo SA, located on the Polosul complex. This tripartite joint venture is characterised by a rather turbulent history concerning changes in ownership structure. The initial participating firms were the French Ato Chimie, which possessed 25% of all shares in 1980, Petroquisa, which possessed 24% of the shares, and two national private firms, which held the remaining shares. Due to various problems, the French transnational as well as Petroaplub, one of the local partners, wanted to sell their shares in 1989. The American Dow Chemical wanted to expand their production of low-density polyethylene and was very eager to buy all available shares. Petroquisa wanted, however, to avoid a too much foreign domination and Dow obtained permission to buy only 25% of Ato Chimie. With this move Petroquisa maneuvered itself into a somewhat difficult position because it had to buy the remaining shares and became, with 45%, the majority shareholder of Petroquimico Triunfo.[36] The implicit rule that Petroquisa was not allowed to held more shares than the majority shareholder was broken and, as a result, the influence of Petroquisa in the Polosul increased.

Within the group of national private entrepreneurs that invested in the petrochemical sector, no common agreement with respect to state participation existed. Some of the local entrepreneurs supported the view of José Juca Neto and were in fact rather satisfied with the participation of Petroquisa. An example is the director president of the São Paulo based Unipar, Michael Hartveld, who remarked in the magazine Bolsa:

"Many of the leaders of the sector admit that the future configuration of the national petrochemical park is still dependent on the presence of the state as a shareholder in the central cracking unit and the second generation plants."[37]

4.3.5. The importance of Norquisa

A clear example of the changing role of Petroquisa can be seen in the creation of the holding company Norquisa out of the Camaçari-based central cracking unit Copene, at the end of 1979. Petroquisa owned 52.49% of Copene and the 17 first

established downstream enterprises owned 47.51%. The fact that private interests were dispersed between 17 enterprises meant it was impossible to form a countervailing balance against state participation. Another disadvantage of the ownership structure was that Petroquisa possessed more than half of all shares, making Copene a state enterprise which restricted it in many ways. Profits generated by Copene, for example, could not directly be used for investment in other projects since extensive government screening always had to take place. Another disadvantage felt by the private participants in Copene was that the dividends they received for their share in Copene were too small to invest in a profitable way.

In order to overcome the problems related to the dispersed nature of Copene, a complex reorganisation took place in 1980. As part of this reorganisation the individual shares of all down-stream enterprises were united in a newly created holding, Norquisa (Nordeste Quimica SA) (see table 4.1.). Because the shares of Petroquisa diminished to 48.16%, Copene could, from that moment on, no longer be considered a state company. This made it possible to use the profits of Copene without succumbing to bureaucratic regulations. Moreover, with the creation of Norquisa the dividends that were initially divided between all 17 participating firms could be reinvested together in a more profitable way. These reinvestments focused in particular on the fine chemical sector.

Although Norquisa is a private holding, it is heavily influenced by the petrochemical technocracy. One reason is that some important former directors of Petroquisa, Copene and Petrobras are appointed to the board of the new holding company. The most important of them, Ernesto Geisel, the former director of Petrobras and the former president of the Brazilian Republic is President of the board. Another is Peronni, a former member of the board of directors of Petrobras, who became one of Norquisa's directors in 1983. In this way, the bureaucratic interests coopt the national entrepreneurs of Camaçari, alienating the transnational corporations. As the most important supporter of stimulation of national investments in the fine chemical branch, Norquisa represents a threat to foreign firms.[38] According to the petrochemical technocrats, heavily supported by Norquisa, it is necessary to reduce foreign domination in this branch.

The board of directors of the two other central cracking units, i.e. Copesul in the Polosul and PqU in São Paulo, also expressed the wish to privatise their state owned company. Copesul, 67.22% of which was owned by Petroquisa, 30.72% by the BNDESpar and 2.06% by private enterprises, was privatised in 1987 when a change in shareholder composition resulted in minority participation of the state.[39] With respect to PqU things seem to be more complicated. Despite several serious proposals from the board of directors of this central cracking unit to the Brazilian government, PqU was still state dominated by the end of 1990.

Table 4.1. Reorganization of the composition of shareholders of Copene

percentages/ shareholders	1978	1980
Petroquisa	52.49	48.16
CPC	6.19	-
Edn	4.82	-
Politeno	4.82	-
Ciquine petroquimica	4.84	-
Oxiteno	3.65	-
Polialden	3.65	-
Acrinor	3.45	-
Nitrocarbono	3.45	-
Polipropileno	3.45	-
Pronor	3.45	-
Isiocianatcos	2.75	-
Ciquine quimica	0.37	-
Copenor	0.34	-
Deten	0.34	-
Melamina	0.34	-
Metanor	0.34	-
Sulfab	0.03	-
others	1.06	4.61
Norquisa	-	47.19

source: Suarez, 1985

4.4. The increasing importance of national petrochemical entrepreneurs

One of the objectives behind the choice to apply the tripartite model was to stimulate national entrepreneurial groups to invest in the petrochemical industry. A number of Brazilian entrepreneurs - although this was rather limited - was already involved in the chemical sector before the second petrochemical complex was constructed. In this chapter they are referred to as sector-related entrepreneurs. It was only after the implementation of the Camaçari complex that new industrial groups started to invest in the petrochemical sector. These groups of non-sector related entrepreneurs apparently had nothing to do with the chemical sector but in a relatively short time they became rather important.

4.4.1. Some sector-related firms: Unipar, Ultra, Ipiranga and Cevekol

As was described briefly in chapter 4.2.1., the first national companies to invest in the petrochemical industry were the Capuava/Unipar group, headed by Paulo Geyer, and the Ultra group which belonged to the Igel family. Both were represented in the first central cracking unit PqU.

The Capuava company, which later became the Unipar holding, consisted of a conglomerate of two Brazilian families, the Geyer family and the Soares family. They joined with the financial group, Moreira Sales, and the national company, Ultra, to take part in the PqU initiative. Evans remarks about the Unipar group:

> "The most surprising thing about the sequence of events that led to the creation of the Unipar group is that the entrepreneurial inputs came from local capital. Paulo Geyer and the Capuava group are universally acknowledged, by both Brazilians and foreigners in the industry, to have taken a risk that few multinationals would have dared, despite their greater resources."[40]

When Paulo Geyer decided to appoint Roberto Campos, the former minister of planning, as one of the directors of his group, the influence of Unipar began to wither. Geyer/Campos based their strategy on an increase in private influence on the petrochemical industry; they wanted state influence to diminish. When it appeared that this strategy was not going to work, the Moreira Sales group decided to leave Unipar, causing serious financial problems for the group. They had to reduce their share in PqU and at the end of 1974 the only involvement of the Capuava group in petrochemicals was voting control of the Unipar holding company.[41] Due to the failure of this strategy, Paulo Geyer decided to step aside and handed the leadership of Unipar over to Michael Hartveld, a first-line technocrat. Before his assignment to Unipar, Hartveld worked closely with the petrochemical technocracy. In cooperation with Clemente de Oliveira, at that time director of Copene, he designed a development programme for the petrochemical industry for the period 1960-1976.[42] The appointment of Hartveld was a turning point for Unipar and the company began to grow again. Hartveld decided to follow a completely different strategy and linked Unipar much more to Petroquisa than Geyer had done.[43]

Despite the difficulties experienced by Unipar in the seventies, the company can now be considered one of the largest national petrochemical companies in Brazil. Since it began selling shares in the stock-market in 1969, Unipar has become the petrochemical company with the largest number of individual shareholders: in 1988 it counted 20.000 shareholders.[44] In that year the company consisted of 16 subsidiaries. Seven more projects, worth 320 million US dollars, were planned for the near future.[45] Unipar's activities are mainly concentrated in the chemical sector as its participation in the chemical firms PqU, Poliolefinas, Carbocloro, Brasivil and Deten shows. Outside the chemical sector Unipar also invests in electronics by means of Cirpress SA and manages commercial activities by means of 'Unipar commercial e distribuidora'.[46]

Another sector related firm is Grupo Ultra, a company that began with Pery Igel's successful distribution of bottled gas. In the sixties and the seventies the Ultra group highly diversified its activities. Its affiliates varied from Ultrafertil, producing fertilizer, to Ultralar, a supermarket chain. At the end of the sixties, Beltrão, the former minister of planning during the government of president Costa e Silva, was appointed to reorganise the company and to define its future strategy. Beltrão stopped the diversification of Ultra and decided to concentrate investments in the petrochemical industry. The first step taken under his direction was to sell the Ultralar supermarket chain.[47] The strategy of the Ultra group was just the opposite of the strategy initially followed by Geyer and Campos from the Unipar group. Instead of alienating itself from the petrochemical technocracy, they entered into a strong relationship with Petroquisa. Evans writes:

> "(Ultra) depends on personnel who have been trained in state enterprises. Aside, from Beltrão, with its experience in the state apparatus, there are perhaps a dozen executives trained by Petrobras, including Paulo A. G. Cunha, who is the vice president of the group's holding company Cobrapar."[48]

Beltrão expanded the activities of Ultra that were associated with Petroquisa. To a larger extent than Unipar, Ultra associated itself with foreign firms and undertook tripartite joint ventures. The most important Ultra firm was tripartite: the company Oxiteno, which consisted of a joint venture between the national groups Ultra, Monteiro Aranha and Rosemberg, the state company Petroquisa and the foreign firm Halcon. Oxiteno is the only company that participates in all three petrochemical complexes.[49] Another activity of Ultra is Ultratec, a technological Research and Development (R&D) center. The R&D that is undertaken in this center focuses mainly on the petrochemical sector.

The next important sector-related petrochemical firm cannot easily be overlooked; when driving alongside Brazil's highways one always runs into one of the 2.984 petrol service stations of Ipiranga. Hierarchically directly following Petrobras, Shell and Esso, Ipiranga is the fourth largest petrol distributer in Brazil. The company started as an oil refinery, founded by an Argentine/Brazilian group of investors in 1933. When in 1938 the government declared by decree that oil production was restricted to Brazilian-born citizens only, the company was bought by Pedro Gouveia Vieira, a lawyer from the south of Brazil. The family Gouveia Vieira succeeded in building up a diversified company that can be included among the five largest national firms in Brazil. The activities of Ipiranga are no longer limited to oil refining and distribution; a large range of industrial and service activities are carried out by the 24 different firms that are headed by the Ipiranga holding. These activities vary from petrochemical production to insurance, hotels and transport facilities. When in the seventies the petrochemical industry became more important Ipiranga decided to concentrate on this branch. In 1989 the majority of their new investments went to their petrochemical associated firms. Petrol distribution remained their most important activity, however, which is illustrated by the fact that from a total annual revenue of 1.8 billion US dollars in 1988, 80% still came from petrol distribution and was responsible for a Brazilian market share of 11%.

Ipiranga is the company that is most involved in the tripartite model. In Polosul, Ipiranga is, for example, associated in one firm with Rhodia/Petroquisa and in another firm with Hoechst/Petroquisa. Furthermore, the company possesses its own R&D center, Isatec, which is dedicated in particular to the research of petrochemical and chemical production processes.[50] In addition, Ipiranga is interested in the production of fine chemicals.

The fourth of the national companies that were already linked to the chemical sector, is Peixote de Castro. This firm originated with one of the private-owned refineries that existed in Brazil before Petrobras monopolised oil refining: Maguinhas Refiniria SA, which was located near Rio de Janeiro. In the sixties, the company moved into the production of methanol and formed Prosint SA. With the implementation of the Camaçari complex, Peixote de Castro strengthened its position in the petrochemical sector but it still did not enter into tripartite joint ventures.[51]

Finally, Cevekol is a national petrochemical group originating from a sector-related branch. This company was created by Ralph Rosemberg, a Jewish refugee who fled from Germany to Brazil in the early forties. Having left behind all of his property, he started a plastic toy distribution center in the garage of his house: Companhia Plastico Trol. This business grew into a mayor plastic-producing conglomerate that eventually entered into petrochemical production as well. The strategy of Ralph Rosemberg was much more focussed on alliances with foreign enterprises than with the petrochemical technocracy; almost all of his ventures involved foreign participation, but state participation was of much less importance. The activities of Cevekol are very dispersed. Although the company concentrates on chemical and petrochemical production, other activities, such as for instance, the selling of real estate and the management of shopping centers and hotels are carried out as well. When Ralph Rosemberg died in 1986, the leadership of the company was taken over by his only child Monica Rosemberg.

4.4.2. Some non-sector related firms: Mariani, Odebrecht, Banco Economico

In deciding which national private firm would be allowed to participate in the Camaçari complex, the government gave priority to regionally based entrepreneurial groups. This resulted in the entry of non-sector related firms into the petrochemical business or as Evans puts it:

> "One effect of the tripé has been to bring local groups into the petrochemical industry that have no obvious reasons for being there."[52]

And Suarez states in his book:

> "When we analyze private national participation, it is clear that a division can be seen between various groups. Most of these groups did not possess any past experience in the chemical or petrochemical sector, not even in the industrial sector."[53]

Evans presents three examples of non-sector related firms. The first is the construction firm, Camargo Correia, which participated with Mitsubishi and Petroquisa in

Ciquine Quimico. Evans' second example is the Coimbra Bueno group, which became a partner in Polibrasil SA along with Royal Dutch Shell and Petroquisa. Euvaldo Cruz, which is Dupont's partner in Salgema, is a third non sector-related participant.[54]

Evans' remark that local partners like these may create problems[55] is clearly illustrated by the fact that ten years after Evans finished his research, not one of these three local firms is operating anymore in the petrochemical sector. Camargo Correia encountered severe financial problems and decided to sell its shares in Ciquine; Shell bought out the Coimbra Bueno group because it could not keep pace with technological developments and Dupont urgently asked Petroquisa to take over the shares of Euvaldo Luz because of severe managerial problems.[56] Despite the veracity of the statement 'local partners who prove to be liabilities are one of the risks inherent in the tripé'[57], not all alliances with local non-sector related firms encountered this many problems.

An example of a still successful non-sector related firm is the Odebrecht group: a family that started the construction company 'Construction Norberto Odebrecht' in 1944 in the state Bahia. The company was involved in some of the largest construction works in Brazil, like the nuclear power plant Angra dos Reis II, the international airport of Rio de Janeiro and the Itaïpu hydroelectric dam. The construction activities made Odebrecht one of the largest exporters in Brazil. Various kinds of construction services were exported to Peru, Chile and Argentina in Latin America and to Gabon, Nigeria and Angola in West Africa. Although construction comprised 80% of the annual return of the company, it showed the smallest growth figures in the eighties. The reason for this was that Odebrecht became involved in petrochemical production in 1979 and started to concentrate most of its new investments in this sector. When Camaçari came on stream, Odebrecht was not among the first regional groups involved in the petrochemical complex. When the regional group Camargo Correia could no longer keep its shares in the petrochemical companies, CPC and Ciquine Petroquimica, because of financial problems, Petroquisa asked Odebrecht to buy these shares. In this way, Odebrecht associated with both Petroquisa and the Japanese Mitsubishi. Once involved in petrochemicals, Odebrecht expanded its activities to the oil exploration and exploitation sector and even decided to go into the mineral sector. In 1985 the company possessed eight sea platforms and two more oil-exploitation sites on land, all managed by its subsidiary Odebrecht Perfuraçoes Ltda (OPL) making it the largest national oil exploiting company in Brazil. With respect to the exploitation of minerals, Odebrecht is involved in the copper mines of the mineral company Caraïba Metais in Bahia, and in the potassium mines of Petrobras in Sergipe. Odebrecht is now the 14th largest non-financial company of Brazil.[58]

A second non-sector related company that entered into petrochemical production in 1971 is the Banco Economico. Founded by the family Calmon de Sã, the Banco Economico is a financial institute of importance in Bahia. The company was closely attached to the technocracy, which is illustrated by the fact that one of its founders, Angelo Calmon de Sã, became minister of Industry and Commerce, at the end of

the seventies.[59] The company, now headed by the three brothers Calmon de Sā, highly diversified its activities. The financial activities, distributed among 284 banking branches, still form the major part of its business, but petrochemical production and real estate are two other main activities. With respect to petrochemicals, the Banco Economico, by means of its holding company Conepar, is involved in Polialden, associated with Sumitomo and Petroquisa; and in Ciquine Quimica, associated with Mitsubishi and Petroquisa. Estimates in 1990 show that its future projects in the petrochemical sector will involve around 152 million US dollars. Several luxurious residential areas as well as some of the most outstanding hotels in Salvador are owned by the Banco Economico.

Grupo Mariani or Banco Mariani Bittencourt (BBM) is a financial company that also started to invest in petrochemicals when Camaçari was about to be implemented. BBM is a family conglomerate, with the family Mariani Bittencourt dominating 83.6% of its shares. The imperium of Mariani has grown to its present size because its banking activities are spread throughout the whole country. As a regional Bahian group, BBM was at the end of the sixties asked by Petroquisa to begin investments in some of the petrochemical ventures of Camaçari. At the end of the eighties, the largest part of its investments went into the petrochemical sector by means of its subsidiary BBM Petroquimica. This division of Grupo Mariani is involved in seven petrochemical projects, in most cases associated with Petroquisa as well as with foreign partners. The Camaçari based firms in which BBM participates are Nitrocarbono, (with Petroquisa and DSM) Sulfab, (a subsidiary from Nitrocarbono) Pronor (with Petroquisa and Dynamit Nobel) Isiocianaticos (with Petroquisa and DuPont) and Policarbonatos (a subsidiary of Pronor). The president of BBM, Carlos Mariani, became a powerful person in the national petrochemical scene due to the high level of involvement of the company in the tripartite model. In 1988 he was elected as president of the petrochemical association ABIQUIM for the second time.

4.4.3. Relative power between national entrepreneurs: ABIQUIM

So far the most important representatives of the petrochemical national producers have been described. Together they form the Brazilian petrochemical bourgeoisie; one of the pillars of the tripartite model. This petrochemical bourgeoisie is closely interrelated and among its members several formal and informal relational patterns exist. One of the most important formal institutions in which national petrochemical representatives coordinate their activities and interests is ABIQUIM which was founded in 1964,[60] at the instigation of private firms, national as well as international. The reason for its creation was, amongst others, that the regional federations, like the FIESP and the FIERGS,[61] were too much bound to regional interests and paid little attention to sectoral interests. Negotiations on the national level about the interests of the chemical sector proved to be difficult. The members of ABIQUIM are first and second generation petrochemical companies. Because most of the 260

enterprises represented are of considerable size, ABIQUIM can act as spokesman for 90% of the chemical sector.[62]

When ABIQUIM was founded in 1964 the chemical sector was almost completely dominated by foreign enterprises. As a result, the chemical association also consisted primarily of foreign members.[63] ABIQUIM can be seen as a product of the first transnational corporations in the chemical industry.[64] The national companies that were participating in the association during the sixties were mostly of Paulista (São Paulo) origin. As can be seen in table 4.2., only four of the 24 directors represented Bahian companies in 1977. The petrochemical technocracy also had a minor representation: Otto Perroni of Petrobras was the only state participant among the 24 directors. When the petrochemical complex in Camaçari reached completion, the composition of the directory of ABIQUIM, especially the division between participants of the state technocracy and the industrial bourgeoisie, changed considerably. From the beginning of the eighties onwards, the division of the representatives of the association was slightly more in accordance with the division in the tripartite model. This meant, in the first place, that the importance of petrochemical technocracy increased ending the hegemony of the private, predominantly foreign, dominance. In the second place, the greater importance of the Paulista entrepreneurs in the petrochemical association changed somewhat as a more equal regional distribution of ABIQUIM directors developed. (see table 4.2. and figure 4.2.) At the end of the eighties this situation changed again: the Paulista entrepreneurs recovered their former position while the importance of the petrochemical technocracy declined in a relative sense. When the various president directors of ABIQUIM are compared, the initial importance of the state technocracy becomes clear: in 1985 Otto Perroni, a representative of the petrochemical technocracy[65] was elected president.

The actual division of petrochemical production, in which the Bahian complex compromised more than 50%, is reflected in the election of president directors of ABIQUIM: in two different periods, 1983-1985 and 1987-1989, ABIQUIM was headed by Carlos Mariani, the president director of the Bahia based BBM.

The role of foreign companies in ABIQUIM is also subject to change. While in the sixties transnationals dominated the association, their influence seemed to lessen during the seventies. In the eighties, the situation changed again and although after 1977 no foreign representative was appointed president, or even vice president, the number of representatives of foreign petrochemical firms increased considerably. This is in strong contradiction to the analysis of Suarez, who states that the petrochemical technocracy in particular, linked to the national private bourgeoisie, is gaining in importance.[66] It is not unlikely that Suarez bases his conclusions on the more informal relational patterns that existed among the Brazilian members of ABIQUIM. In his book he mentions, for example, a dinner that took place the evening before Carlos Mariani Bittencourt was elected president of ABIQUIM, on the 21th of May 1983:

> "On the night before the solemnity (-) Geisel and Beltrão had dinner - lasting four hours - in the house of Pery Igel (patriarch of the Ultra Group) together with a select group of members of the technocracy and the bourgeoisie, among

them Paulo Cunha, Otto Perroni, Marcos Viana (ex-president of BNDE during president Geisel), Jorge Gerdau Johannpeter, Claudio Bardela, Olavo Setubal, Abilio Diniz and Carlos Mariani. Of course, we do not have exact data to evaluate the nature of articulations that were brought forward during these 'gastronomic events'. But when we consider the facts succeeding, we believe that during these events the unification between the technocracy and the 'grand' bourgeoisie was effectuated."[67]

Table 4.2. Composition of ABIQUIM Board of Directors and successive President Directors according to origin of representatives in the period 1977-1989 in absolute numbers and percentages

years	1977		1981/3		1983/5		1985/7		1987/9	
origin representatives		%		%		%		%		%
São Paulo	8	33	8	32	6	25	7	24	10	30
Bahia	4	17	3	12	5	21	7	24	7	21
Technocracy	1	4	2	8	4	17	4	13	4	12
Foreign firms	7	29	9	36	9	37	10	34	12	36
Others	4	17	3	12	1	0	1	5	0	0
total	24	100	25	100	24	100	29	100	33	100

source: deducted from annual reports ABIQUIM

Figure 4.2. Origin of President Directors of Abiquim in the period between 1977 and 1989

director presidents		firm	origin
1977	Edgardo de Azevedo Suarez Junior	Elekeiroz	foreign company
1981/3	Paulo Cunha	Oxiteno	São Paulo
1983/5	Carlos Mariani Bittencourt	BBM	Bahia
1985/7	Otto Perroni	Norquisa	technocracy
1887/9	Carlos Mariani Bittencourt	BBM	Bahia

source: deducted from annual reports ABIQUIM

It is not uncommon to make important decisions during informal meetings such as this dinner, thus eroding the influence of foreign representatives. Evans also mentions the importance of informal, personal relations between the technocrats and national entrepreneurs:

> "The shaping was done less by overall policy decision, than by informal personal contacts among the individuals involved."[68]

Another informal network, linking important national private petrochemical firms together and excluding foreign companies, was to be found among several, mostly Bahian-based petrochemical entrepreneurs. Once every fortnight a selected group of entrepreneurs met for dinner. Among them Eduardo Gouveira Vieira of the Banco Economico, Monica Rosemberg of Cevekol, Carlos Mariani of BBM, Angelo de Sa Neto of Odebrecht, Paulo Cunha of Ultra and Michael Hartveld of Unipar.[69] These informal meetings were organised to exchange some -but of course not all- information concerning firm strategies and are for the purpose of defining common interests.

4.5. The third partner in the tripartite model: the transnational corporation

The third partner in the tripartite model is the multinational enterprise. As can be seen in table 4.3. practically all existing chemical transnational corporations are represented in Brazil but not all of them participate in the tripartite model. In this section a brief view will be given of four of the most important foreign chemical enterprises in the country; Dow Chemical, which purposefully stayed outside the tripartite model for a reasonably long period of time; Shell do Brasil, which only hesitantly participated; Rhone Poulenc, with its relatively large involvement in tripé joint ventures and Mitsubishi, which participated exclusively in tripartite joint ventures. Furthermore, the opinion of several members of the technocracy and national bourgeoisie with respect to the participation of foreign firms in the tripartite model will be compared.

4.5.1. Foreign enterprises outside the tripartite model: Dow Chemical

The American-owned Dow Chemical is an example of an important chemical enterprise that operated for quite some time outside the tripartite model. Worldwide Dow Chemical is one of the most important petrochemical conglomerates with petrochemical complexes all over the globe. In most of its complexes, Dow Chemical owns the various succeeding generations itself, from the central cracking unit to the third generation plant.[70]

Table 4.3. Most important multinational chemical enterprises in Brazil present in the three petrochemical complexes in 1987

Complex São Paulo	Camaçari/CIA	Triunfo
Dow Chemical	Dow Chemical	Ato Chimie
Union Carbide	Mitsubishi	Hoechst
Hoechst	Sumitomo	Rhodia
Atlas	Idemitsu	Hercules
Electro Cloro	Rhodia	Scientific-
Rhodia	EMCA	Design
Shell	Ciba Geigy	
EMCA	Liquid Carbonics	
Ciba Geigy	AKZO	
ICI	Dupont	
Bayer		
Basf		
AKZO		
Montsanto		
Vulcan		
Dupont		

source: Quimica e derivados, Julho 1987

Dow Chemical entered Brazil at the beginning of the seventies, at the time when plans were being made to expand the petrochemical industry outside São Paulo. Since various foreign enterprises were already present and competing with each other in São Paulo, Dow Chemical decided to focus its strategy on Bahia. In conformance with its, until then, always successful concept, Dow Chemical wished to establish a petrochemical firm in Bahia to produce ethylene and vinyl chloride monomers of which it would be the sole owner. With this in mind, the American company ignored government policy which at that time had the objective of implementing the tripartite model in an integrated complex in Bahia. The way in which Dow Chemical succeeded in obtaining the final approval for its 100% foreign-owned petrochemical complex is rather peculiar.[71] At the instigation of Angelo Calmon de Sã, Dow appointed General Golbery do Couto e Silva, founder of the National Information Service,[72] to be president of its Brazilian subsidiary. With the support of this influential person, Dow succeeded in 1972 in obtaining permission for the construction of a propane oxide producing company in the Industrial Center of Aratu (CIA)[73]. The second phase was to be the construction of a soda-chloride plant which was rejected by the CDI because not enough feedstock, caustic soda, was available. When in Alagoas a tripartite project between DuPont, the BNDE and the national group, Euvaldo Luz, began, under the name of Salgema, Dow received

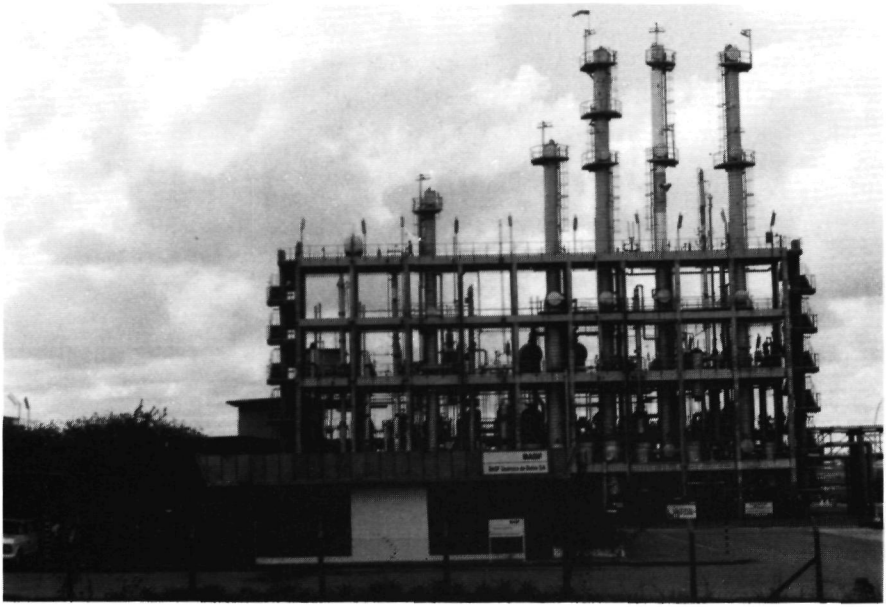
approval for its factory under the condition that it participated in this tripartite joint venture. Dow refused, however, and discovered a reservoir of caustic soda only a few months later on the island Matarandiba, right in front of the already constructed Dow harbour. Once again Dow applied to the CDI for approval of a 100% owned Dow project. Attracted by promising export figures -the exports could reach 500-800 million US dollars in a period of about ten years- and stimulated by well established relations between the company management, headed by Colbery Couto y Silva and the state technocracy, the government approved this project in 1975 and even promised subsidies of $ 173 million.[74] In this way Dow succeeded in operating outside the tripartite model and in establishing a 100% owned petrochemical downstream complex in the industrial center of Aratu (CIA), near the Camaçari complex. In this complex four production entities were constructed, using their own feedstock, caustic soda.[75] At the end of the eighties, the attitude of Dow changed to such extent that the company even decided to participate in two tripartite joint ventures, in the Camaçari and the Polosul complex, respectively. This remarkable change will be further discussed in chapter 7.3.3..

In Brazil Dow Chemical had an annual turnover of 530 million US dollars in 1989 which makes it the 16th largest company in this country. The transnational is represented in five production sectors -petrochemicals, plastics, pharmaceuticals, agrochemicals and chemical consumption goods- and possessed 19 production companies in 1986.[76] Its further investment plans for the period 1989-1999 involve 500 million US dollar.[77] Most expansion projects will be dedicated to the substitution of imports and product diversification.

4.5.2. Hesitant participants: Shell do Brasil

An example of a foreign firm that did enter into the tripartite structure, but only hesitantly, and in a very modest form, is the Anglo/Dutch company Shell do Brasil. Shell is one of the foreign multinationals that not only has a long history in Brazil, but is also considered to be the largest enterprise in the country. The corporation started to invest in Brazil in 1919, when it was involved in oil exploration. Nowadays Shell's ventures are not limited to oil exploitation, but embrace a large variation of activities in the production as well as in the distribution sphere. The investments of Shell in Brazil vary from oil exploration and distribution to plant breeding, from tourism to the manufacturing of minerals. The most important share of the annual return of Shell comes from its petrol distribution centers. Three thousand Shell service stations can be found all over Brazil and are good for a market share of 21%. A second important activity is the exploration and exploitation of minerals which is carried out by the subsidiary Billiton. In several locations, amongst others, the Amazona Forest, Billiton possesses huge concessionary areas in which important minerals such as bauxite are excavated and sold to other companies for further processing. Oil exploration and exploitation have diminished in importance since the Brazilian government introduced the so-called risk contracts.

Photograph 3: Various foreign subsidiaries invested in the Camaçari complex: BASF



Photograph 4: Various foreign subsidiaries invested in the Camaçari complex: Ciba Geigy

In 1975 Petrobras restricted the involvement of transnational corporations in oil exploitation, allowing them to participate with so-called risk contracts only.[78]

Petrochemical production is another area in which Shell is involved, although on a rather limited scale in comparison to their other activities. In 1977 only 10% of their worldwide sales of 36.680 million US dollars consisted of petrochemicals.[79] That petrochemical production is not the first priority of Shell is reflected in their involvement in the Brazilian petrochemical complexes. Shell started to invest in the petrochemical industry in 1978 when Polibrasil, a polypropylene producing joint venture with the participation of Petroquisa, was constructed in the São Paulo region. More than ten years later, in 1989, Shell invested again in a petrochemical tripartite joint venture, this time in Rio de Janeiro. The long interval between these two investments can be explained by the rather reluctant attitude of Shell to compromise itself within the tripartite model. The opinion of Shell is expressed by its management:

> "Shell has nothing against participating in joint ventures, but they will participate only when they see the advantages of this participation. For example when capital investments in the petroleum branch are too large, and hence too risky for one firm, Shell shall happily join with other petroleum firms to execute the large scale operation together and share the risks. But to sign a joint venture agreement not out of financial reasons, but out of technological and political reasons is something else and Shell is not very eager to step into this kind of business"[80].

Certain advantages, however, regarding the government policy[81] concerning the chemical industry in particular, could not be denied by Shell. As a result the chemical giant tried to obtain shares in the complex of Camaçari and Polosul on its own conditions. However, they did not succeed in either of the two complexes. In the second half of the seventies they began negotiations to obtain a percentage of the shares in Deten, a firm located in the Camaçari complex and producing acyl benzene. The negotiations did not bring the expected results, however, and Shell did not continue. According to the present managing director of Deten, Shell was afraid of the competitive power of his firm and did not want to sell its technology. Deten, therefore, purchased the needed technology from the US-based technology transnational, Universal Oil Products (UOP).

> "Shell was trying to hinder production of our firm primarily because they were afraid that Deten and Shell would conquer similar markets, which can be true, as we export 40% of our production and 25% is going to European markets, predominantly the Netherlands."[82]

In another firm on the petrochemical complex of Camaçari, Ciquine Quimica, Shell tried to associate with a national partner. In this case as well negotiations proved to be a dead end and Shell decided to step out before construction even began[83].

When observing the relative success of the petrochemical tripartite joint ventures, Shell admitted to have 'missed the train'. When, in the National Petrochemical Programme (PNP), the expansion of the petrochemical industry was announced, Shell was among the first firms to react. Together with Ipiranga and Polipropileno SA based in Camaçari, the transnational presented an investment proposal to the

CDI, to construct a high density polypropylene producing firm near Rio de Janeiro.[84] Like the other transnational companies, Shell is extremely interested in the fine chemical sector. So far the company did not make much technological progress in this sector, but, nevertheless, they started a fine chemical producing unit in Paulinia, São Paulo, with total investments of 10 million US dollars. In this company the fine chemical ional oxidant will be produced, which is meant to serve as a raw material for food, cosmetics, additives, rubber and polymers.[85]

The total number of production units in Brazil possessed by Shell in 1986 was 36.[86] While the total turnover of this transnational in 1988 amounted 3.8 billion US dollars, the net revenue accumulated in the same year was 130 million US dollars.[87] New projects planned in the next couple of years made it necessary for Shell to double its investments: in 1989 total investments amounted to 213 million US dollars, of which 25 million US dollars will be invested to create Braspol.[88]

4.5.3. Early participants: Rhodia

One of the foreign enterprises that seemed less reluctant to enter into the tripartite model and actually participated in several different projects, is Rhodia do Brazil, the Brazilian subsidiary of the French Rhone Poulenc. While already present in the São Paulo petrochemical complex in several different plants, Rhodia was willing to participate in the Camaçari tripartite companies as well, and it began to take part in two different joint venture firms: Unirhodia and Acrinor. When the third petrochemical complex was announced, Rhodia again signed up and joined in the tripartite joint venture Polivinil. This involvement within the framework of the tripartite model linked Rhodia to some extent to the petrochemical technocracy. The president of the French company in Brazil, Paulo Somers, is respected within the technocracy and has represented the opinion of the foreign companies at several petrochemical congresses. Despite their rather firm position within the Brazilian petrochemical industry, the attitude of Rhodia towards participating in the tripartite model changed during the eighties, however. One of the reasons for this change is the restrictive Brazilian policy with respect to the fine chemical industry, that is becoming an increasingly important production activity of Rhodia. Due to the strict observation of import substitution regulations regarding, in particular, the production of intermediary fine chemicals, Rhodia has a choice between buying intermediaries from Brazilian-owned fine chemical firms, which have recently begun operation, or transferring its subsidiaries that produce fine chemical intermediaries to locations in Brazil.

Although the largest part of its annual return is still provided by the petrochemical sector, the fine chemical division -divided into pharmaceuticals, agricultural chemicals and animal feedstock- is already the second most important division of Rhodia. Together these sub-divisions were worth 14.9% of the total annual revenue in 1986.[89] The rather ambitious expansion plans of Rhodia -it plans to invest a total of 450 million US dollars in the next five years- focus on the area of fine chemicals.

These investments are meant to replace the rather large imports of this chemical transnational. In 1986, Rhodia imported raw materials, primarily for its fine chemical plants, worth 31.2 million US dollars.[90] The most important project in this import-substitution program, and at the same time the most controversial one, was the new salicylic acid plant -the raw material for aspirins- which has been built near São Paulo. Although construction began as early as 1983, by 1987 the CDI still had not given permission to start production.[91] The reason for this delay can be found in the construction of another salicylic acid plant in the Camaçari complex by a tripartite joint venture, which purchased its technology from the Mexican Salicilatos de Mexico, a former partner of the German Bayer. The Brazilian market was considered too small for two salicylic acid plants and the CDI urged Rhodia to produce for export only.[92] The assistant Secretary General of the CDI, Cassaro, is of the opinion that:

> "Rhodia does not want to substitute imports, but to destroy local competition. We've been importing aspirin for 90 years, but Rhodia only started its factory when a local company appeared with technology bought from Mexico."[93]

This matter could also jeopardize Rhodia's rather good position within the tripartite model.

Rhodia do Brasil is one of the most important chemical enterprises in Brazil and in 1986 it even was the enterprise with the best overall performance. The total annual return in 1986 was 770 million US dollars.[94] The new investment plans of Rhodia in Brazil are rather ambitious: in the next ten years the transnational plans to invest 2 billion US dollars. Part of this money will come from capital owned by the subsidiaries and part of it will be provided by the parent company.[95] Most noteworthy is the intention to dedicate increases in production realised from these investments to the export market. Rhodia is planning to increase its export share from 10 to 20% of total company's sales in five years time.[96]

4.5.4. Eager participants: Mitsubishi

The last important participant in the chemical industry that will be described in this chapter is the Japanese Mitsubishi. This foreign participant, which did not possess any investments in Brazilian petrochemical companies before the Camaçari complex came on stream, would probably not be represented in Brazil if the tripartite model did not exist. It was only within the construction sector that Mitsubishi was represented in Brazil for a longer period. Mitsubishi Heavy Industries entered Brazil in 1963 and established a joint venture with the Brazilian 'Companhia Brasileira de Caldeiras e Equipamentas Pesadas'.[97] Mitsubishi did not begin investing in the petrochemical industry until the end of the sixties, by means of Mitsubishi Chemicals, a firm transformed into Mitsubishi Kasei in 1989. Because the state technocracy wanted to diminish the dominance of American and European companies in the petrochemical industry, it invited Japanese companies to invest in the new Camaçari complex. Mitsubishi was the Japanese firm that responded most positively to this

request and, in the beginning of the seventies, began to participate in five different joint ventures, all located in Camaçari, including, for instance, Ciquine and CPC. In all of these joint ventures Mitsubishi is associated with Petroquisa and a local national company. Mitsubishi did not start participating in any other petrochemical complex.

For Mitsubishi, Brazil is one of the single most important countries for expansion of overseas investments: in the period 1989-1993, 45% of investments of Mitsubishi world wide will be realised in Brazil which means that investments in this country will double.[98] Compared to the other chemical transnationals investing in Brazil, Mitsubishi is only a small investor; it does not appear on the list of the 20 largest chemical enterprises in Brazil, nor can it be found among the 500 largest companies in the country.[99]

4.5.5. Foreign participation in the petrochemical industry: a polemic question

Although an indispensible partner in the tripartite model, the presence of the foreign participant in the chemical joint ventures was not welcomed with equal enthusiasm by every party concerned. In an article about the Brazilian petrochemical industry, Evans remarks:

> "Scarcely one month after the official inauguration of the Camaçari pole, its organisers were shaken by unexpected accusations. João Cunha, an opposition deputy from São Paulo, rose in the house of representatives to denounce the petrochemical pole, saying: 'The Camaçari pole is in the service of foreign interests'. (-) Consequently, in Cunha's view, the financial incentives provided by FINOR and others to tripé firms were illegitimate, if not illegal, since such incentives were reserved for locally controlled firms."[100]

Not only directly after the inauguration, but also ten years later, in 1989, nationalistic Brazilians were still opposed to the overall presence of foreign participants in the tripartite model. Nationalistic entrepreneurs and technocrats prefer a restriction on the participation of transnational companies and claim that up-to-date technology can easily be developed by national R&D centers or bought from international centers. They consider the contribution of transnationals as unnecessary from the technological point of view and even harmful since profits are transferred across the border, out of the country. Bautista Vidal, a consultant of the federal government, is very concerned about this process:

> "(Transnational corporations) occupy economic space in peripheral countries without giving these countries the possibility to protect or preserve this space for national firms. The worst thing however is that (-) in this way cultural and political space is also occupied and technological packages are imposed as new forms of domination."[101]

But another group of entrepreneurs and technocrats do not consider the participation of transnational corporations as merely negative. They are of the opinion that especially in the provision of technology, the presence of foreign enterprises can be

advantageous. Because of the fast changes in the technology process they believe that the absorption and development of up-to-date technology is too expensive for national enterprises. Adary de Oliveira, director supervisor of the Companhia Petroquimica de Camaçari, is of the opinion that:

> "Although the tripartite model is slowing down the process of nationalisation of the sector, the participation of transnational corporations is still necessary, especially in the new Rio complex. The participation of transnational corporations will even increase because of the debt conversion".[102]

In the next chapters, the participation and the contribution of the foreign firms will be looked at in more detail.

4.6. Summary and conclusions

The coexistence of state enterprises, national private enterprises and foreign companies in the Brazilian chemical industry is used by the government to design a development model that will increase the national production of petrochemicals. Especially with respect to the second and third petrochemical complex, the Camaçari and Polosul complex, the tripartite model was an explicit government tool.

Several factors make it possible to implement this model. In the first place, in the period between 1964 and 1985 military rulers laid the foundations for the emergence of a petrochemical technocracy consisting of relatively autonomous institutes. It is partly thanks to the efforts of the state-owned company, Petroquisa, the National Development Bank, BNDES, and the Industrial Development Council, CDI, that the third pillar of the tripartite model plays a significant role. It can not be denied, however, that the important role of these state institutions is subject to changes. The first signs of an actual decline in direct state involvement in the petrochemical industry could be noticed at the end of the seventies when the strict regulations concerning state participation changed. With the implementation of the Camaçari complex the rule was that Petroquisa could not participate with a smaller share than the largest partner. When the projects for the Polosul complex were designed, this rule was no longer necessary. Despite this change in regulation, the actual participation of Petroquisa did not decline at that time because the national entrepreneurs asked Petroquisa to participate. During the first half of the eighties positive developments in the petrochemical industry made it unnecessary for Petroquisa to further diminish its shares in this sector. And despite serious opposition on the part of the national private bourgeoisie, Petroquisa still used this policy in the second half of the eighties.

The national private bourgeoisie was only slightly involved in the petrochemical industry before the Camaçari complex was constructed. The few sector-related national companies that could be found in the São Paulo complex or elsewhere in Brazil were: Unipar, Ultra, Peixote de Castro, Cevekol and Ipiranga. The government

objective to reinforce the national petrochemical bourgeoisie in the seventies can be called successful, however. After the establishment of the Camaçari complex, several non-sector related firms began to invest in petrochemical firms. Most of these firms originated from non-industrial sectors such as Odebrecht, which originates from the construction sector, and Grupo Mariani and Banco Economico, both originating from the financial sector. In a relatively short period of time the influence of these non-sector-related companies increased considerably, which is evidenced in the appointment of Carlos Mariani as president-director of the most important petrochemical association, ABIQUIM. Informal relations between several national private entrepreneurs further strengthened their position in relation to foreign companies.

The last partner in the tripartite model is the multinational company. Because of the attractive conditions provided by the government and the rather favourable prospects of the petrochemical industry in the seventies, many foreign companies were interested in participating. However, not all of them liked the idea of participating in tripartite joint ventures with the state. Supported by their good relations within the state technocracy, the American multinational Dow Chemical succeeded in remaining outside the tripartite model for a long time.

The efforts of Shell to invest outside of the model were less successful. In several projects, Shell began negotiations with certain conditions for participation, but in most of these cases the negotiations failed and their place was occupied by another foreign company. It was only in 1989 that they signed a contract to participate in a tripartite joint venture. A multinational that seems to encounter less problems with the tripartite structure is the French Rhodia. Their involvement in tripartite joint ventures is significant. Furthermore, their president director Paulo Somers is a well-known representative of ABIQUIM and his opinion can be heard at several petrochemical congresses. Because of the restrictive policy of the Brazilian government with respect to foreign investments in the fine chemical industry, the attitude of Rhodia is changing in a negative sense. The last multinational that is described in this chapter is the Japanese Mitsubishi. At the request of the Brazilian government, this Japanese multinational started to participate in tripartite joint ventures. As a consequence of their recent history in the Brazilian petrochemical industry, their influence among the petrochemical multinationals has been relatively small. In contrast to the other foreign participants, the Japanese firms, and with them Mitsubishi, only invested in the petrochemical industry in the form of joint ventures, mostly of the tripartite kind.

From this chapter, it becomes clear that the role of state technocracy, national private partners and foreign participating firms is rather dynamic and subject to change. The extent to which this dynamic process influences on the functioning of the tripartite model is, however, not yet clear. More light will be shed on this subject in the next chapters, when a more detailed view of the Camaçari complex will be presented.

Notes chapter four

1. Evans, P., Collectivized capitalism: integrated petrochemical complexes and capital accumulation in Brazil. in: Bruneau and Faucher, Authoritarian capitalism: Brazil's contemporary economic and politic development, Westview press, Boulder, 1983, p 93.
2. Evans, P., 1983, p 93.
3. Suarez, M. A. Petroquimica e tecnoburocracia, capitulos do desenvolvimento capitalista no Brasil, Editora Hucitec, Sao Paulo, 1986, p 81.
4. Ibid. p 81.
5. Ibid. p 123.
6. Hartveld, M. 1982, p 27.
7. Ibid. p 28.
8. Ibid.
9. Teixeira, F. The political economy of technological learning in the Brazilian Petrochemical industry, PhD Thesis, University of Sussex, 1985, p 255.
10. Evans, P., 1983, p 92.
11. Rappel, Interdisciplinary Center for Research for the Public Sector, ISP/UFBA Salvador, interview, April 1988.
12. The investment fund FINOR (Fundo de Investimento do Nordeste) forms part of the SUDENE development corporation. In chapter 5.4.4. the functioning of this program will be described into more detail.
13. Evans, P., 1983, p 101.
14. Evans, P. Dependent development; the alliance of multinational, state and local capital in Brazil, Princeton University Press, Princeton, 1979, p 217.
15. The administration of Quadros that succeeded Kubitschek's government did not last for more than sixteen months.
16. Suarez, M. A. 1986, p 73.
17. In 1990 the CDI was transformed into the SDI, 'Secretaria' instead of 'Conseilho'.
18. Annual report ABIQUIM, 1984, p 5.
19. Translation: "Perspectives on the participation of the BNDE in the financing of the chemical industry", Petroleo e quimica, 8/9, 1972, (1-21) p 19.
20. Petroleo e quimica, 8/9, 1972, (1-21) p 19.
21. Ibid. p 20.
22. Evans, P. 1979, p 218.
23. Interview Petroquisa, May 1989.
24. Nunes and Geddes, Dilemmas of state led modernisation in Brazil, in: J.D. Wirth; Edson de Oliviera Nunes; Th, Bogenschild, (ed) State and society in Brazil: continuity and change, Westview Special Studies on Latin America and the Caribbean, Boulder, 1987, p 104.
25. Evans, P. pp 240 and 246.
26. Suarez, M. A., 1986, p 83.
27. In the period form 1974 till 1979 Geisel became president of Brazil.
28. Suarez, M. A. 1986, p 85.
29. The RLAM, Refinaria Landulfo Alves de Mataripe, constructed by the CNP, start operation in 1950.
30. CLAN: Consultaria e Planejamento.
31. Teixeira, 1986, p 186.
32. This congress, 'Soluções para a expansao da Industria Petroquimica', (solutions for the expansion of the petrochemical industry), was organised by the newspaper Gazeta Mercantil and the employers trade union SINPER on the 29th and the 30th of January 1987.
33. Thomas Unger had been one of the directors of the French chemical transnational Rhodia before he became one of the most important consultants for the national private entrepreneurs in the petrochemical industry.
34. Gazeta Mercantil, 2-2-1987.
35. Setor petroquimica apresentou desempenho muito bom em 1985, Petro & Quimica, november 1985 (17-30) p 20.
36. Gazeta Mercantil, 10-1-1989.
37. Petroquimica crese e exige refinamento, BOLSA, may 1989 (10-21) p 16.
38. Suarez, M.A. 1986, p 173.

39. A industria petroquimica brasileira, trinta anos depois, Petro & gas, september 1987, (10-24) p 14.
40. Evans, 1979, p 231.
41. Ibid. p 234.
42. Galazi, J. Petroquimica vive fase aurea, in: Bolsa, aug. 1988, (16-22) p 17.
43. Suarez, 1985, p 103.
44. Latin American investors conference, A. Mayer, Unipar, january 1988 Beverly Hills, California (1-31) p 8.
45. Ibid., p 9.
46. Ibid., p 4.
47. Suarez, 1985, p 102.
48. Evans, 1979, p 243.
49. Suarez, M.A., 1985, p 102.
50. Coutinho, M.C. Entrevista com João Pedro Goviea Vieira, do Grupo Ipiranga (75-76) in: Petro & Gas, sept 198,7 p 76.
51. Evans, P., 1979, p 243.
52. Ibid. p 52.
53. Suarez, M.A., 1985, p 125.
54. Evans, P. 1979, p 240.
55. Ibid.
56. Interviews with managers of Shell, and Ciquine.
57. Evans, P., 1979, p 241.
58. A ofensa do Grupo Odebrecht, Exame nr 334, 4-9-1985, pp 76-86
59. Suarez, M.A., 1985, p 150.
60. ABIQUIM: Associação Brasileiro de Industrias Quimicas y Produtos Derivados.
61. FIERGS: Federaçao das Industrias de Estado Rio Grande do Sul, "During the 1970s and 1980s Rio Grande do Sul industrialists continued to rely mainly on the typical regional form of organisation and interest representation that are part of the traditional class representative structure, recognised and regulated by the federal state: the Sindicatos de Industria and the FIERSG", Kees Koonings, 1988, p 105.
62. The cadastre of ABIQUIM counts approximately 1000 chemical firms in 1987.
63. Interview with executive director of ABIQUIM, Ruben Gomez, Sao Paulo, 1988.
64. Suarez, M.A., 1985, p 158.
65. Although Norquisa can juridically be considered as a national private enterprise - having the majority of its shares in private hands- its directors, like Otto Perroni and Ernesto Geisel, all originate from the Petrobras/Petroquisa bureaucracy, which suggests a predominant influence of the petrochemical technocracy.
66. Suarez, M.A., 1985, p 159.
67. Suarez, M.A., 1985, p 225.
68. Evans, P., 1981, p 96.
69. Interviews with various petrochemical entrepreneurs.
70. An example of such a complex outside the US is the DOW complex in Terneuzen, the Netherlands. In this complex four different petrochemical units were constructed, a harbour was constructed and an oil storing area was build.
71. The following analysis is predominantly based on the findings of Suarez, M.A., 1985, pp 108-116.
72. The National Information Service was the most important instrument during the period of military regime -between 1964 and 1985- to ensure political stability by means of repressive methods.
73. The CIA is located near the Camaçari complex, approximately 40 kilometers from the state capital Salvador.
74. Evans, P., 1983, p 88.
75. Initially the Dow Chemical project was much more extensive. The American company wanted to construct a petrochemical complex with a central cracking unit like the one Copene established, based on naphtha. By using the export institution BIEFIX, they almost got approval for this project as well. Strong resistance from the side of the national industrial entrepreneurs, supported by the petrochemical association ABIQUIM, thwarted the project, however, and Dow Chemical never obtained final approval for these investments.
76. Jean Bernett, Guia Interinvest, 6th edition, Rio de Janeiro, p 365, 1986.
77. Gazeta Mercantil, 10-1-1989 and 25-12-1989.

78. Risk contracts imply that the transnational involved only receive revenues from Petrobras when an economically exploitable amount of oil has been discovered. This contract can not be changed afterwards when no oil has been found. Petrobras, 1986, p 20.
79. Teixeira, T., 1985, p 50.
80. Interview with the investment director of Shell, March 1988, São Paulo.
81. Above all the subsidies and incentives that the Brazilian government promised to firms wishing to establish in Camaçari, were very attractive for Shell.
82. Interview with the managing director of Deten, Camaçari, April 1988.
83. Interview general manager Ciquine, august 1989, Camaçari.
84. This firm will not be constructed in the new petrochemical complex of Rio de Janeiro (in Itagaï) because production is not dependent on the new raw material plant.
85. Dirigente Industrial, January 1986, p 32.
86. Jean Bernett, Guia Interinvest 6th edition, Rio de Janeiro, 1986.
87. Gazeta Mercantil, 22-11-1988.
88. Gazeta Mercantil, 22-11-1988.
89. Gazeta Mercantil, relatorio especial sobre quimica fina, 1987.
90. Gazeta Mercantil, relatorio especial sobre quimica fina, 1987.
91. South, november 1986, p 107.
92. Tercer Congresso Brasileiro de Petroquimica, Quimica e Derivados, sept 1984, (22-32) p 31.
93. South, november 1986, p 107.
94. Exame, Melhores e Maiores, p 279, São Paulo, sept. 1987.
95. Gazeta Mercantil, 25-9-1989.
96. Gazeta Mercantil, 15-5-1989.
97. Empresas Japonesas aplicam mais capital no Brasil, in: Tendencia, august 1974, no 11, p 66.
98. Interview with the President director of Mitsubishi, Rio de Janeiro June 1989.
99. Exame, Melhores e Maiores, p 277, sept 1987.
100. Evans, 1983, p 102.
101. Bautista Vidal, 1987, p 110.
102. Quimica e Derivados, 1987, p 30.

5

THE PETROCHEMICAL COMPLEX OF CAMAÇARI

5.1. Introduction

When driving by car from Salvador, the state capital of Bahia, to the north the landscape changes rather rapidly; leaving the green palmy coastline behind you, you approach the desert of northeast Brazil. Approximately 60 kilometers away from Salvador the bright white sand dunes are quite suddenly interrupted by a completely different view. Situated on a large flat area, the petrochemical complex of Camaçari appears in front of you like a huge smokey island. In this totally deprived region, where small farmers and villagers try to survive the extreme drought, the government decided to locate what is now known as the largest one-time investment in a fully integrated petrochemical complex in the world: the Camaçari complex.[1]

In order to understand the functioning of the tripartite model on the level of the firm, the characteristics of the individual companies in the Camaçari complex need to be outlined. In the first place, it is necessary to present a clear picture of the total number of firms located in the Camaçari complex and fluctuations in the number since the complex began. In addition to their absolute number, it is important to pay attention to the activities of the firms: to which industrial branch do they belong, what products do they produce and what is the volume of their production? A very important aspect of firm production can naturally be found in the revenues of the companies: their annual turnover, profits and profitability. One last interesting aspect that will be described in this chapter is the expansion of production of almost all Camaçari firms which will take place as part of the National Petrochemical Programme.

The Camaçari complex is distinguished from other complexes by the specific ownership structure of the companies. Due to the various investment structures, different ownership structures exist side by side. Tripartite joint ventures, bipartite joint ventures and 100% owned companies can all be found in the Camaçari complex. Although the various participating firm partners are responsible for capital input, most of the financial capital originates from external sources such as the National Development Bank, BNDES, and the Development Corporation, Sudene. Both capital suppliers will be described in more detail in section 5.4.

There was a rationale for locating the Camaçari complex in the relatively backward region of northeast Brazil, in the state of Bahia. It was hoped that the complex would stimulate regional development. In section 5.5. various regional development possibilities will be described, beginning with the input/output linkages: what is the origin of the raw material used by the Camaçari firms, and what is the destination

of their products? The employment possibilities, a second important aspect relating to regional development, will be described next. To what extent does the complex generate a large number of jobs? Finally, linkages to the location of decision-making centers and R&D laboratories will be described.[2]

5.2. The petrochemical complex of Camaçari

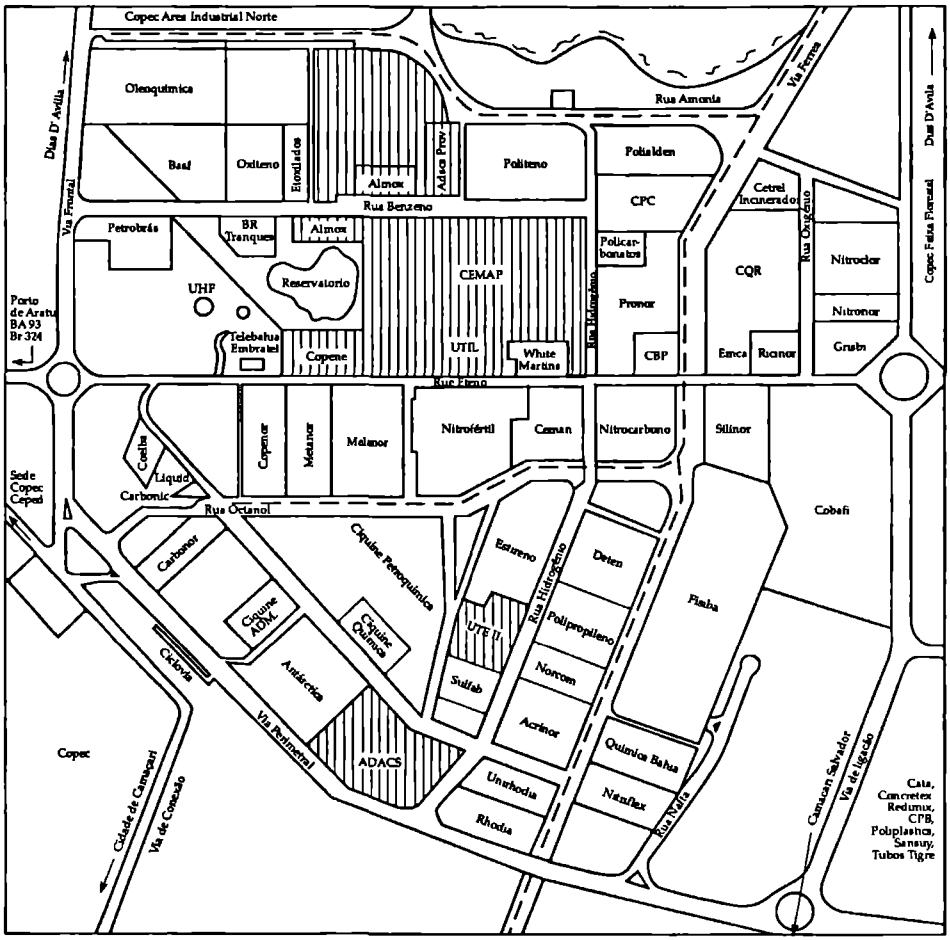
The petrochemical complex of Camaçari is located in between the two small and insignificant villages Camaçari and Dias D'Avila. The state government chose this location because of the flatness of the area surrounded by slope hills, the availability of ground water reservoirs and because at the moment the decision was made three firms already existed there. Several roads and one railway connect the complex with the outside region. Because the complex itself is not located near a harbour, the main road leads to the harbour of Aratu.[3] Transport by road and water are the most important means of transport for the firms in the complex.

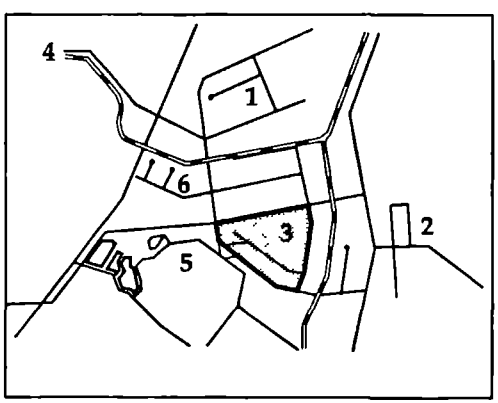
The complex is divided into four different zones. (see figure 5.1.) The central zone, the basic complex, was constructed first and is the most important part, housing the central cracking unit, Copene, and most of the downstream firms. Also the Ceman, the 'Central de Manutenção' which takes care of maintenance at the complex and the CETREL, 'Central de Tratamento de Efluentes Liquidos SA', which takes care of all industrial waste, can be found in this area. The infrastructural facilities have the highest standard in this area and consist of an extended network of various types of water, electricity, telephone connections, resource and products pipes and a sewage system.

The northern part of the complex is reserved for sector-related firms such as fine chemical and fertilizer companies. It is a short distance from the basic complex, where less infrastructure is available. Water supplies are limited and only one type of water can be obtained. These firms are not directly connected to Copene. Because lot prices are lower in this region, other types of enterprises are attracted to the area. For instance, firms that need a large area - like the steel company, Caraïba Metais - and firms that do not need the inputs from Copene - the fine chemical firms, for example - are located here.

According to the projected development of the complex, as designed by COPEC, the third zone of the complex, located on the eastern side, was reserved for the third generation branch. In this region, the establishment of the plastic transformation firms was projected. These firms were to make use of the output of the petrochemical firms, produce for the regional market and provide employment opportunities to the villages located nearby. For several reasons, and in contrast to the early plans, few plastic transformation firms were established in this area.

Figure 5.1. The petrochemical complex of Camaçari





1 = northern industrial area
2 = eastern industrial area
3 = basic complex area
4 = western industrial area
5 = special use area
6 = transport sector

source: COPEC, 1989

The fourth part of the complex, finally, the so-called special area, is located at some distance from the heart of the complex, hidden behind large hills. Here, situated in the relative green surroundings of an old fazenda, the coordinating and supporting units can be found. These institutions are partly government-owned and partly owned by private subcontracted firms. The most important one is the COPEC: 'Complexo Petroquimico de Camaçari'. This coordinating institute was created in 1973 in order to coordinate the administration and promotion of the complex. The work of the 161 employees can be compared to the work of municipal employees. In short, the tasks of the COPEC consist of area planning, monitoring of construction activities, guaranteeing security, securing environmental protection, selecting and training of human resources, maintaining the infrastructure and relocating ambulant street vendors. The COPEC obtains its resources from the Bahian government, supplemented by a compulsory contribution from all firms located on the complex. Technology used by the firms is the main responsibility of another institution located on the special area, the CEPED, 'Centro de Pesquisa e Desenvolvimento'. Other government institutions located on the complex include the electricity company, Coelba, 'Companhia de Eletricidade do Estado da Bahia', the telephone company, Telebahia, and some institutions providing social services and educational facilities.

A coordinating committees which directly serves the petrochemical firms, the COFIC; 'Comité de Fomento Industrial de Camaçari' is located close to the COPEC buildings. The eighteen persons employed here are mainly occupied with defending the interests of patrons. The directory consists of representatives of Camaçari-based firms. The employers union, SINPER, 'Sindicato da Industria Petroquimica e de Resinas Sinteticas do Estado da Bahia' and the SINPAQ, 'Sindicato da Produto Quimicos para Fins Industriais de Camaçari', are two institutions that defend the interests of employers and negotiate with trade unions. Finally, the subcontracted firms, providing services to all firms located on the complex, such as the highway bus companies, can be found in the special area. Six of these privately owned companies provide transport 24 hours a day between the Camaçari complex and Salvador.

5.3. Economic characteristics of the petrochemical firms on the complex of Camaçari

In order to analyse the functioning of the tripartite model, it is important to consider the characteristics of the chemical firms located on the complex of Camaçari. Firms belonging to the service sector, such as engineering firms, transport companies and cleaning firms, are not included in this analysis. State companies located in the central zone of the complex, like Copene, Cetrel and Ceman, are also not taken into consideration. Copene is not included because, as the central cracking

unit, its specific characteristics differ too much from the downstream chemical companies to make fair comparison possible. Cetrel and Ceman are excluded because their activities are more focused on the service sector. Finally, non-chemical related industrial companies, such as the three construction firms which played an important role in the construction of the chemical firms during the implementation of the complex, and the metallurgical company, Caraïba Metais, are excluded. Also, the two beverages firms located on the complex, Industria de Bebidas Antartica do Nordeste SA and CIBEB, Companhia de Bebidas da Bahia, will not be included in the analysis.

5.3.1. Number and industrial branches

At the time the petrochemical complex was planned in Camaçari a couple of firms had already been established at the projected location. In the beginning of the sixties, when neither the concept of tripartite joint ventures nor the idea of a petrochemical complex existed, three companies started a production plant at some distance from Camaçari. These firms established themselves at this specific location because of the availability of water and the existence of a flat area. The first firm established here was the brewery Antartica which was constructed in 1967 and began production in 1970. A second firm, constructed in 1968, was Nitrofertil, a company producing fertilizer owned by Petrobras; one year later, in 1969, the synthetic fibre company FISIBA, presently named Celbras, was constructed. In 1974, the Camaçari project became a reality and several firms began to construct their production units. Except for one firm, all were completely new companies.[4]

As can be seen in Table 5.1. twenty-seven firms began operation around 1979. During the ten years that the complex has existed the total number of firms steadily increased. Between 1985 and 1988, this increase stopped temporarily, however. In 1985, 43 firms were operating on the complex and, despite the fact that the 12 firms projected had already been approved by the SDI, the number of productive firms in 1988 remained the same. This stagnation is directly related to the economic recession during the early eighties. Because of this recession entrepreneurs were reluctant to begin construction of new projects that had already been approved and preferred to wait until conditions cleared up. In 1989 the number of producing firms increased to 50 firms. This increase did not quite correspond with the number of projected firms which was 12 in 1985 and 15 in 1988. This means that a relatively large number of firms that had already been approved never began production or stopped production shortly after they started.[5] In fact, only 5 of the 15 projected firms in 1988 were indeed realized in 1989.[6] According to these figures, many projects did not succeed. Later on in this chapter the reasons for this phenomenon will be analyzed.

The increase in the number of firms is somewhat misleading since some of these firms can considered to be juridical expansions. The incentives that had stimulated the construction of the Camaçari complex, such as the ten year tax holiday, also

provided a stimulus for the creation of 100% subsidiaries of existing Camaçari-based firms. Even when the enlargement of a firm was no more than a expansion of firm capacity, it was more propitious for entrepreneurs to create a new affiliate. By giving the new subsidiary another name the entrepreneur could once again benefit from existing fiscal incentives and tax holidays. For this reason, several firms chose to expand production creating a new company -the so-called 'juridical expansions'. Ciquine Petroquimica, Unirhodia, CBP and Firene are examples of these juridical expansions.

Table 5.1. The number of firms located on the petrochemical complex of Camaçari between 1979 and 1989

year	1979	1980	1985	1988	1989
operating	27	28	43	43	50
projected	12	n.a.	12*	15*	4
cancelled	-	15	3	10	

source: annual reports of COPEC, firm survey 1989

* : these two figures do not refer to the same firms.
n.a. : non available

The total number of firms has increased, but what are the production activities of these companies and in which industrial branch can the largest increase be noticed? The majority of all firms located on the complex consist of downstream petrochemical enterprises. In 1989 almost half of the total number of firms belonged to the petrochemical branch. It is remarkable, however, that their number barely increased between 1980 and 1989. (See table 5.2.) The limited capacity of the central cracking unit Copene from which almost all petrochemical plants obtained their input, may be one reason for this phenomenon. In the ten years the petrochemical complex has been functioning, the ethylene capacity of Copene has not increased which directly limited the number of downstream plants. Only after the realization of the Petrochemical National Programme in 1991, when Copene should have doubled its capacity, can it be expected that the number of down stream plants will increase. In the initial project 'Camaçari' was designed as a totally integrated petrochemical complex which meant that all three generations of the chemical sector had to be located in one area. The first generation would be formed by Copene, the central cracking unit; the second generation by the downstream plants, the third generation would consist of the chemical transformation industry such as the plastic industry. It seems, however, that this integration concept has so far not worked for the chemical transformation industry, which in 1989 was still of minor importance in Camaçari.

Table 5.2. The number of firms located on the petrochemical complex of Camaçari according to industrial branch

year	1980	1985	1988	1989
branch				
petrochemical	20	20	20	21
petro/fine	1	3	3	3
fine chemical	2	9	7	13
plastic/rubber	0	4	3	3
others	5	9	10	10
total	28	45	43	50

source: annual reports of COPEC, firm survey 1989

The most important reason for this is that location on the complex is too expensive for the relatively small transformation firms. In particular, average labour costs on the complex are higher than the labour costs elsewhere. In the first place the wages are very high, due to the influence of the nearby petrochemical firms which have a well organized labour force demanding high salaries. Second, the complex is located a large distance from population areas which means that the patrons have to supply daily transportation for their workers to and from the plants. Furthermore, given the isolation of the complex, employees can not go home for lunch, which means the factory has to provide meals for the workers. Managers of the plastic transformation firms estimated that total expenses in this area amounted to between one and two extra minimum wages per employee per month. Of course, every firm located on the complex encounters these extra labour costs; but the relatively large number of labourers and the annual turnover, which is much lower than that of petrochemical firms, make these costs insurmountable for the plastic transformation industry. As a result, several construction projects for firms belonging to this branch have been cancelled. Only nationally famous companies such as Tubos Tigre and Sansuy are large enough to adjust to these conditions.[7]

Copec is pessimistic about the prospects for the plastic transformation industry on the complex and from the early eighties onwards it shifted its emphasis from the transformation industry to the fine chemical industry. In an article written to commemorate ten years Copec it was said:

> "After 1981 the transformation industry showed very bad results. (-) This situation made it clear to the state government that they had to re-evaluate their policy and concentrate their efforts on attracting investments to more promising branches like the fine chemical branch."[8]

The figures in table 5.2. show that this shift in policy was not without result. The importance of the fine chemical branch increased considerably after 1980, and in 1989 the fine chemical branch could be considered the second most important chemical branch on the complex. Though the number of firms is promising, quantity alone does not say anything about the performance of these firms which has not been good. The fine chemical branch will be described in more detail below.

5.3.2. Output figures

In addition to the dynamics of various industrial branches, the various characteristics of production by individual companies can provide a clear picture of the functioning of these companies: what are their production activities, what is the volume of production, the annual turnover and the profit rate?

The petrochemical complex of Camaçari has a diverse range of products. Apart from basic chemicals such as polypropylene, benzene and butadene, production consists of thermoplastics like PVC, high density polyethylene, low density polyethylene and polyestyrene; fibers, pharmaceutical products and engineering plastics. A last category consists of products of the chemical transformation industry, varying from large plastics coverings for agricultural use to tiny plastic tubes.

An analysis of figures of the increase and decline in volume of production is not of interest because the production capacity of the downstream petrochemical firms depends on the output capacity of the central cracking unit, Copene. The Brazilian government agency, SDI, the former CDI, has determined the production capacity of all petrochemical firms in Camaçari according to the maximum output of Copene. In most firms on the complex, full capacity of production was reached a couple of years after its start. Despite the fact that the SDI finally decided about the size of the firm, this did not mean there was a uniformity in firm size. The variety of firms located on the complex can be seen in the differences in volume of production: the smallest firm produced 600 tons in 1988, and the largest 480 thousand tons (see table 5.3.).

The volume of production corresponds to industrial branch; the more specialized the production, the smaller the volume. Companies with the largest production volume can be found in the petrochemical branch: two thirds of all petrochemical firms produced more than 50 thousand tons in 1988. Only the metallurgical firm Caraïba Metais exceeded the volume of the largest petrochemical firm. Logically this is a direct result of the nature of production; metallurgical products are more voluminous than petrochemical products. On the other hand, the more specialized fine chemical firms showed the smallest production volumes: all fine chemical firms produced less than 50 thousand tons in 1988. And finally, the transformation branch and the firms belonging to the other branches can all be found in the smaller production categories with an average production less than 100 thousand tons.

Annual turnover, profit figures and profitability of each firm are of importance, as well as production volume. Since the response to the questionnaire asking for

financial data proved to be unsatisfactory[9], a choice was made to base the analyses of profitability on financial figures obtained from the magazine Visão (see table 5.3.). Of the 43 companies included in the firm survey, 38 could be found in the 1989 edition of Visão's 'Quem é Quem na Industrial Brasileira'. The annual turnover figures, the value of the profits and the profitability[10] of these 38 companies are compared. Three of the 38 companies could not provide a turnover figure because of their recent start or because of production problems. Nitroclor is an example of a company that encountered severe problems. This fine chemical plant, considered the most modern factory on the complex, is owned by the 17 first established firms on the complex, united in the holding company Norquisa. The average turnover of all 38 companies in 1988 was 79 million US dollars. If the annual turnover for the different industrial branches is compared, it can be seen that the petrochemical firms were among the firms with the highest turnover. The downstream petrochemical firms registered average turnover figures of 82.4 million US dollars. The companies producing fine chemicals showed much lower turnover figures; they did not surpass the average of 22.2 million US dollars. The two transformation firms, with an average yearly turnover of 28 million US dollars, also did not achieve the high figures of the downstream plants. The firm with the largest turnover figure on the complex was the state-owned fertilizer company, Nitrofertil, with a turnover of 248.5 million US dollars in 1988. The firm with the smallest turnover was Silinor with 7 million US dollars in the same year. (see table 5.3.)

Profit figures of industrial firms in Brazil are largely determined by the price policy of the government. On one hand, the most important prices of the petrochemical input are fixed by the federal government: the price of naphtha as input for Copene, the price of ethylene coming from Copene, the price of the electricity provided by Coelba, and the price of the water supply. On the other hand, the output prices are to a certain extent fixed as well. The prices of most petrochemical products are subject to CIP[11] regulations, which means that they are determined by government policy. Despite this, profit figures can provide some insight into the relative success of the various firms.

With respect to the profit figures of the Camaçari-based firms registered in the Visão edition of 1989, figures for four companies were not available while five companies recorded negative figures. These last five firms did not make any profit at all in 1988. Some of these firms were newly established which explains their negative figures. Most of these companies could be found in the fine chemical branch; only three of the eight fine chemical firms recorded profits for 1988: an average amount of 7.7 million US dollars. Although the fine chemical firms located in Camaçari were recently established, it is obvious that certain obstacles prevent them from making profits. In chapter 6 the situation of the fine chemical firms will be described in more detail. The profits made in the fine chemical industry are high compared to profits of the plastic transformation industry: the two plastic producing companies on the complex of Camaçari had an average profit of 2.7. million US dollars.

Table 5.3. Production volume, turnover, profits and profitability of 38 companies located on the Camaçari complex in 1988 (1000 tons, million US dollars and percentages)

name firm	production volume*	turnover million US$	profits million US$	profitability %
Copene	n.a.	686	434	7.9
CPC	209	189	70	5.6
Ciquine Petro	150	105	24.5	2.8
Ciquine Quimi	39	31.5	1.7	1.4
EDN	150	154	63	7.7
Pronor	122	157.5	70	9.5
Politeno	138	147	66.5	10.8
Nitrofertil	480	248.5	14	3.7
Polialden	102	126	87.5	20.2
Oxiteno	141	161	129.5	30.0
Nitrocarbono	54	119	24.5	6.1
Polibrasil	96	94.5	56	18.1
Celbras	-	101.5	10.5	5.5
White Martins	35	63	10.5	6.8
Acrinor	78	73.5	28	9.6
CQR	100	28	3.5	1.1
Deten	101	91	42	23.5
Rhodia Bahia	30	70	31.5	27.7
Unirhodia	10	42	7	8.3
CPB	18	25.5	-	0.6
Etoxilados	18	38.5	17.5	11
Silinor	-	7	-	n.a.
Metanor	60	14	7	10
Copenor	23	21	10.5	12.8
Nitriflex	-	n.a.	n.a	n.a.
Norcom DuPont	7	17.5	1.54	n.a.
Policarbonatos	5	24.5	2.8	6.1
Cobafi	17	91	17.5	2.5
Sulfab	100	14	-	0.84
Liquid Carb.	8	52.5	28	34.5
Carbonor	28	14	-	n.a.
Nitroclor	-	n.a	n.a.	n.a.
Ciba Geigy	5	49	n.a.	n.a.
Basf	15	21	17.5	39.6
Quimica Bahia	7.6	21	3.5	7.1
Nitronor	0.6	7	-	n.a.
Ricinor	-	n.a.	n.a.	n.a.
EMCA	25	21	2.1	5.7
Cata Nordeste	5	10.5	2.5	n.a.
Sansuy	18	45.5	2.8	5.6

n.a. : Not available due to recent start of the company or impossible to extract form annual report
- : negative figures
* : firm survey 1989

Source: Quem é Quem na economia Brasileira, Visão, September 1989, year XXXVIII, No. 36A

The downstream petrochemical firms show higher profit figures: the average profit recorded in 1988 was 33 million US dollars. Only three petrochemical firms did not register any profit at all: Sulfab, CPB and Silinor. From its start in 1978, it was obvious to the owners of Sulfab that it was not a viable firm and would never make large profits. The firm had an important function, however, since all of its products were used by other petrochemical firms on the complex. Because this input is indispensable, Sulfab was in 1986 sold to Nitrocarbono and Metacril,[12] which wanted to safeguard their input. The company with the largest profit in 1988 was Oxiteno, with 129 million US dollars, and the lowest profit figure, 2.1 million US dollars belonged to EMCA.

Profitability figures are an indication of the performance of the Camaçari-based firms. For nine companies, no profitability figures were available in the Visão edition of 1989. For the remaining chemical firms the profitability was rather high: the downstream petrochemical firms showed an average of 9.5% and the fine chemical companies an average of 17%. This relatively high rate in the latter category can be attributed to only one fine chemical firm: the 100% foreign owned BASF. The other two fine chemical firms, EMCA and Quimica da Bahia, showed much lower rates. When the average of these two branches is compared to the national average of chemical companies it becomes clear that the Camaçari-based chemical companies are doing rather well. The average profitability rate of the Camaçari chemical firms was 10.8% for 1988 while the national average for chemical companies in the same year was 8.7% only. A few petrochemical companies showed profitability rates that were well above the national average: Oxiteno is one of them with 30% and Liquid Carbonics with 43.5% another.

When the profitability rates for various successive years are considered, the same observation can be made: the average profitability rate of the Camaçari firms for the years between 1983 and 1989 was well above the national index for all chemical firms in Brazil. But this does not mean that fluctuations in profitability did not exist. Especially 1984 proved to be a rather bad year for the Camaçari companies; their average profitability decreased by ten points from 17% to 7.8%. while the national average decreased by one point only. Unfortunately, no rates could be obtained for 1985 and 1986, but in 1987 the profitability of the Camaçari firms increased again by 3.3%. For the last two years for which figures were available, profitability was stable at 2% above the national average.

Table 5.4. Profitability of 38 companies located on the Camaçari complex in 1983, 1984, 1987, 1988 and 1989 (percentages)

	profitability				
year	1983	1984	1987	1988	1989
national index:	7.2	6.4	8.8	8.6	8.7
average Camaçari	17.4	9.8	13.1	10.2	10.8

Source: extracted from Quem é Quem na economia Brasileira, Visão, 1983, 1984, 1987, 1988 and 1989

5.3.3. Expansion plans

With the approval of the National Petrochemical Programme, 1987-1995, the firms of the petrochemical complex of Camaçari prepared for expansion. A large number of operating firms immediately applied for new projects and tried to get them approved by the SDI. Among other factors, approval depends on the projected capacity after the expansion of the central cracking unit, Copene. All firms which obtain part of their inputs from Copene must adjust their inventories in order to avoid scarcity or increased imports of feedstock. The expansion of Camaçari is coordinated by the COPEC. The employees of this institute investigated the possibilities for expansion and will coordinate the infrastructural expansion. Furthermore, for the first time investigations measuring the impact of the complex and its expansion on the environment of Bahia were carried out.

To make it possible for the downstream enterprises to expand, Copene will have to increase its capacity during the first two years of the Petrochemical National Programme. The present capacity of Copene will almost double: from 460 thousand tons ethylene annually in 1989, Copene must produce 910 thousand tons in 1991. Total investment costs for this expansion are estimated at 680 million US dollars.[13] But in addition to ethylene, Copene is also going to produce 415 thousand tons of propane, 135 thousand tons of butane and 292 thousand tons of benzene.[14]

Most of the downstream enterprises located in Camaçari - 34 firms or 79% of the total - have plans to expand. Only nine firms said they have no expansion plans at all. Most of the latter firms, such as Quimica do Bahia and Ricinor, started their production very recently. Above all firms in the petrochemical branch intend to expand their capacity; those firms producing intermediary petrochemicals seem to have the most ambitious plans. More specifically, twelve out of the fourteen firms belonging to the intermediary petrochemical producers will expand production. In

the fine chemical branch this picture is the same and ten of the thirteen firms that produce fine chemicals intend to begin expansion projects. Finally, even in the transformation industry Sansuy and Cata Nordeste have applied for expansion. Sansuy will expand its production in cooperation with its main suppliers of raw material: the two Camaçari based firms CPC and Politeno. The reason for this cooperation is that the petrochemical firms want to safeguard their market possibilities by keeping the transformation industry within the complex. Relocation of the firms in this branch would not be in their interest.

For the realization of the expansion of the petrochemical complex of Camaçari an investment sum of 1,2 billion US dollar will be needed. According to the 'Revista Petro & Quimica'[15] 40% of the investments will be generated by the companies themselves while 50% will be supplied by the BNDES. The remaining 10% will be obtained from external financing, but most of this will be related to the import of capital goods. Part of the external financing will come from the International Finance Corporation (IFC). From the firm survey it was learned that more than half of the total number of expanding firms, nineteen, financed part of their expansion with BNDES capital. Commercial loans are not very popular among the expanding firms -only eight firms approached commercial banks. On the average about 40% of all investments will be generated by the firms themselves.[16]

The relatively high figure for self-generated investments can be explained by two factors. First, eight 100% foreign-owned subsidiaries can be found among the 34 firms with expansion plans. These firms depend primarily on their own financial resources, since they are not able to receive the same financial incentives as nationally controlled firms and repatriation of profits is relatively expensive. As a result, the reinvestment of profits is more lucrative for them.

Second, the nationally controlled petrochemical firms are highly capitalized and do not seem to encounter problems with investment in expansion.[17] Or, as stated by the Jornal da Bahia in an article, concerning the expansion of the complex of Camaçari:

> "E não se fala em falta de dinheiro. (-) O dinheiro não e problema". (It is not necessary to talk about money. (-) Money is not a problem)[18]

The expansion of the complex, and especially the improvement of the infrastructure, will drain state and federal resources. A total of 300 million US dollars will be invested by the government during the period of expansion, of which 120 million US dollars will be provided by the state government, while the federal treasury will be responsible for the remaining part.

Various different types of expansion can be found in Camaçari: expansion of existing production capacity, production of new chemicals in the same factory or the construction of a new factory in order to expand production capacity or to start production of a new good. In 21 of the firms that expand, new products will be produced while in 27 firms the expansion means an increase in capacity. The total number of expanding firms seems to be more than 43, due to the fact that various firms obtained SDI permission for more than one project. Nine firms had plans to construct a completely new factory for their expansion but, as already mentioned in chapter 5.3.1., most of these new factories are mere expansions of already existing

factories decorated with a new name. An example of this kind of expansion is Firene, the expansion project of Celbras. The new factory is located on the same terrain as Celbras but it will produce another product: PET chemicals[19]. The new firm will be a 100% subsidiary of Celbras. In four cases the new firm will be constructed in the vicinity of the already existing firm. In anticipation of future expansions most entrepreneurs reserved an area twice the size of the factory they intended to establish. As a result, none of the firms will have to buy new terrain for the expansion. In five cases the expansion will take place in another region: in Rio de Janeiro, Alagoas and São Paulo.

5.4. The ownership structure and financial investments

By now some insight has been obtained into the production activities of the Camaçari-based firms. One of the most specific characteristics of these firms, however, still needs to be described in more detail: the ownership structure of the companies, which is partly the result of the various sources of investment. In this section attention will be paid to the ownership structure resulting from the division of voting shares, the actual investments and the two most important capital suppliers of the petrochemical complex: the National Development Bank, BNDES, and the development organization, SUDENE.[20]

5.4.1. Total financial investments

As previously stated, the petrochemical industry is a very capital intensive industry. To give an idea of the high capital investment costs of the petrochemical complex of Camaçari, total capital investments of the enterprises located on the complex amounted to 3.926 million US dollars in 1985.[21] With the implementation of the Petrochemical National Programme, these investments will nearly double to 6.384 million US dollar.[22]

According to the firm survey, nine of the 43 firms are considered the smaller firms on the complex: their capital investments did not exceed 25 million US dollars. A total of eleven firms registered capital investments of more than 100 million US dollars. As expected, firms belonging to the fine chemical branch and the plastic transformation branch, in particular, were included among the smaller firms on the complex: of the nine firms with investments below 25 million US dollars, six belong to these two branches.

For the Camaçari-based petrochemical firms, these large capital investments originate from different resources. In the first place, the respective partners of the companies are involved. The voting shares are divided between the participating companies according to a division that need not correspond with the respective

input of financial capital. It is possible that a company, for example, invested 3% of the total capital and obtained 33.3% of all shares. Apart from the division of voting shares, financial resources are obtained from the distribution of preferential shares. The holders of preferential shares -issued through the development agency Sudene- are not allowed to influence decisionmaking processes. A third source of financial input to the Camaçari-based companies is loans and credits provided by the National Development Bank, BNDES.

5.4.2. Investment structure and ownership structure

When visiting the Camaçari petrochemical area it is immediately clear that a great number of different entrepreneurs are involved in the companies that form the complex. At the entrance of almost all 50 firms, huge signs display the names of the different companies participating in the firms. A characteristic phenomenon of the Camaçari complex is that various types of ownership structures exist side by side. Of the 50 firms located on the complex in 1989, eight firms, mostly belonging to the fine chemical branch, were completely under transnational ownership. Seventeen firms were national privately owned. These firms were almost equally divided between the petrochemical and the fine chemical branch. In between these two types of firms, that are 100% privately owned, various types of joint ventures can be found. Of course, the most interesting kind of joint venture in Camaçari is the tripartite joint venture; a total of eleven firms are owned by a joint venture between a national state firm, one or more private national firms and a foreign firm. Almost all these tripés belong to the petrochemical branch. In addition to tripés, bipartite joint ventures are represented on the complex, including six joint ventures between national private firms and foreign firms and seven joint ventures between national private and state firms. (see annex 1.)

The division of shareholders does not give a clear view of the origin of various capital investments. A further step is, therefore, to define the sources of these capital investments and the contribution from the respective partners of the triple alliance. Although several relatively large private Brazilian groups participate in the petrochemical firms of Bahia it is obvious that they are not the main suppliers of capital. Only 9% of total capital investments in 1987 originated from national private participants. Only 3% of the investments is provided by the foreign partners.[23] Although Petroquisa is the largest capital investor of all partners, their investments comprised only 12% of the total capital investments. The largest part of these investments, 76%, was provided by external suppliers.

Photograph 5: Fiscal incentives of the CDI and financial support of the FINEP to the tripartite firm Polialden

Photograph 6: Even 100% foreign firms on the Camaçari complex obtain financial support from Sudene and FINOR

One of the external sources that contributed to the construction of the petrochemical complex of Camaçari are the international banks. It proved difficult, however, to calculate the amount of financial capital that originates from international sources. Evans mentioned that in the first years that the complex existed, 1,2 billion US dollars came from the international banking community, almost half of the total capital investment.[24] It is not, however, clear whether Evans included only foreign loans or direct foreign investment as well because the figure he mentions in his book seem rather high: according to COPEC data, 10% of total capital investments originated from foreign loans in 1987. The most important external suppliers involved in the Camaçari complex were the National Development Bank, BNDES, and the Development Corporation for the North East, SUDENE. Below a more comprehensive view of the financial involvement of these government institutions will be presented.[25]

5.4.3. The National Development Bank, BNDES

As previously stated, the main objective of the National Development Bank is the stimulation of social and economic development in Brazil. In order to realize its objectives, the BNDES can make use of several instruments. As part of the BNDES, the FINAC[26], created in 1977, provides finance capital in the form of loans. Physical or juridical persons can apply for these loans with an amortization period of 10 years. Firms that apply for these loans need to supply between 30% and 50% of the total amount of investments from their own resources. The interest rates are fixed but a monetary correction is applied in accordance with the inflation rate. This latter regulation did not exist at the time most petrochemical firms in Camaçari applied for FINAC loans, in the period 1973-1978. The effects became apparent at the end of the seventies when inflation boomed,[27] resulting in a rapid devaluation of the loans. This, in turn, was highly advantageous for the entrepreneurs of the Camaçari companies who could easily service their debts.

Apart from the financial programmes based on the provision of loans with low interest rates, the BNDES also participated directly as a shareholder in some of the Camaçari firms. In 1974 the BNDES created three subsidiaries which were united in one subsidiary, the BNDESpar, in 1982.[28] The purpose of the BNDESpar was to diminish the risk of capital-intensive firms. Firms that encounter financial problems can ask the BNDESpar to participate. The privately owned metallurgical firm Caraïba Metais is one example. After severe financial problems, the BNDESpar saved this firm from bankruptcy by buying 33% of all shares.[29] Another function of the BNDESpar is to complete tripartite joint ventures. When two partners wishing to form a joint venture cannot reach agreement on the division of shares, the BNDESpar can solve the problem by participating as the third partner. COBAFI, a former tripartite firm producing synthetic fibers, is one example of this. Since COBAFI is not an intermediary petrochemical firm, it did not need the participation of Petroquisa.[30] SDI, however, did not want to approve a fifty/fifty joint venture

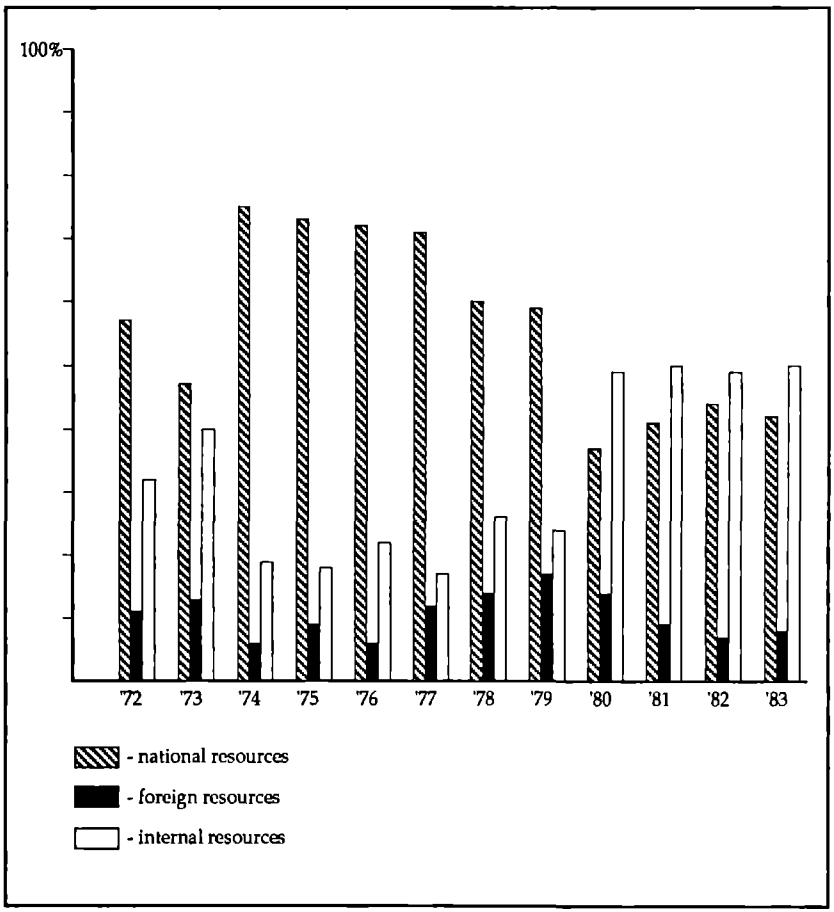
between the national private group, Roche Miranda, and the Dutch-based, AKZO. To solve this problem the BNDESpar decided to buy one third of the assets of COBAFI, thereby enabling the establishment of a joint venture adjusted to the tripartite model.

The BNDES was not created for the sole purpose of stimulating industrial development, nor does it support only petrochemical activities. But because of their large interests in the chemical branch, previously described in chapter 4.3.1., BNDES has contributed loans of considerable magnitude to this sector. In the seventies almost a quarter of all loans reserved for the basic production goods sector[31] were directed to the chemical sector; in 1975 this was 23%. In 1983 the percentage of BNDES loans in the petrochemical branch declined to 11%.[32]

But where do the financial resources of the BNDES come from? Three sources can be identified. (see figure 5.2.) During the most important period, as concerns this book, the period of the implementation of the Camaçari complex, the largest contribution of financial capital was of national origin, amongst others, from the so-called PIS/PASEP programme.[33] This programme was of great importance during the mid seventies but has declined ever since. The PIS/PASEP system is a national tax to which every entity in the country contributes: all firms contribute 0,5% of their annual turnover, all juridical persons apply 5% of their income taxes and all state and municipal entities transfer 2% of their revenues. Besides these taxes, the national contribution to the BNDES funds takes the form of loans and donations. The second source of income for the Development Bank are foreign loans which were relatively high at the end of the seventies. After 1980 this share declined to a percentage of only 8% in 1983. Thirdly, the BNDES obtains its capital, like every bank, through the internal return of its own financial capital. This source was important in the beginning of the seventies. During the mid-seventies the importance declined until in 1977 a low point was reached. Since then it has increased in importance again and, six years later, in 1983, half of all capital resources of the BNDES was being generated by the bank itself.

The large involvement of the BNDES in the Camaçari complex is obvious when observing its share of the investments of the firms belonging to the second generation. In 1987, 48% of these investments, 1.146 million US dollars was provided by the BNDES.[34] In 1989, 17 firms claimed to have used BNDES loans, varying from 1 to 80% of their total investments. On average the percentage of investments provided by the Development Bank was 32%.

Figure 5.2. Origin of BNDES resources between 1972 and 1983, in percentages



source: Annual reports of the BNDES 1972-1983

5.4.4. Development Corporation SUDENE

Another government institution that played a role in the supply of finance capital to the Camaçari complex, although of less significance than the BNDES, is SUDENE. This federal agency, created in 1959, is directly related to the Ministry of Internal Affairs. Its main objective is to stimulate development in the backward northeastern region of Brazil.[35] The instruments used by SUDENE are numerous. Besides fiscal

incentives like an import duty tax exemption and income tax exemption or deduction, SUDENE also provides financial investments in the form of preferential shares through FINOR.[36] Up to a certain percentage of total capital investments -not surpassing 75%- preferential shares of the company can be purchased by external juridical persons.

SUDENE finances different industrial sectors of which the petrochemical branch is the most important. Until 1981, 18% of all SUDENE's resources was directed to this branch.[37] Because most industrial development in the northeast can be found in the Bahian region -not in the least because of the location of the petrochemical complex in this state- a substantial portion of the SUDENE/FINOR incentives are spent in this state: for example in the first part of 1989 the percentage was 23%.

Compared to other financial resources, however, the SUDENE/FINOR played a rather insignificant role in the petrochemical complex of Camaçari. In 1987, 17% of all capital investments came from FINOR investments, in accordance with the figures found in the firm survey of 1989. Of the 29 managers that answered the question concerning the origin of their investments, ten remembered or discovered the contribution of the FINOR. In fact, the percentage of capital investments covered by the FINOR proved to be very small. The average contribution of the SUDENE/FINOR in the initial capital investments of all firms located on the complex was only 19%. The reason for the relatively small use of FINOR funds was that although most of the petrochemical entrepreneurs applied for the loans, the need to actually capitalize on the FINOR assets did not appear.[38] This was partly due to the BNDES loans which provided the petrochemical firms with sufficient liquidity.

5.5. Regional impact of the petrochemical complex

The petrochemical complex was located in a social-economically deprived region so that it could function as an industrial growth center spreading its beneficial effects throughout the whole region. Fifteen years after the initial birth of the complex a debate took place with respect to these presumably favourable aspects for regional development. The question regarded the extent to which the Camaçari complex indeed fulfilled its role as growth center and whether it was worthwhile to locate a highly capital intensive industry so far away from the industrial heart of the country.[39] Opponents of the location in Bahia argued that because of high transport costs the Camaçari complex could never be economically viable and that individual firms would only accumulate a profit if they were heavily subsidized. One of the directors of Shell remarked:

> "Almost all input to the Camaçari complex originates from the south of Brazil, from areas near Rio de Janeiro and São Paulo and almost all products are transported to the same area of Rio de Janeiro and São Paulo where the

chemical transformation industry is concentrated. Why locate a petrochemical complex in Bahia?"[40]

To understand whether the Camaçari complex can be considered a rich enclave in a continuously poor surrounding and the extent to which the government can influence the developmental impact of the complex, it is necessary to have a closer look at linkages that the chemical firms have developed within the region. Several types of linkages between the petrochemical complex and its surroundings are considered to be of importance: origin of resources, market destination of products, employment possibilities, location of decisionmaking centers and technology linkages.

5.5.1. Origin of resources

In the beginning of the seventies, when the petrochemical complex of Camaçari was planned, the main goal was to establish a completely integrated complex in which the output of one firm in the complex would form the input of another firm in the complex. In this way transport costs of feedstock could be minimized and regional development, it was thought, could be stimulated. In 1985, 44% of all enterprises obtained their inputs, such as ethylene, benzene and toluene, from the central cracking unit Copene.[41] Table 5.5., in which the origin of all inputs is given, demonstrates the high degree of integration. Indeed, the majority of the firms on the complex obtained a large part of its inputs from other firms on the complex. In 1989, 84% of the firms used raw materials from either the central cracking unit, Copene, or from other petrochemical firms on the complex. In addition to Copene, some downstream firms played a very significant role in the provision of inputs. To these types of firms belong for instance Nitrofertil, Sulfab and Acrinor producing, amongst others, ammonia, urea and sulphur. The integrated character of the complex becomes even more clear when the amount of input is considered; more than half of the total number of firms obtained between 76 and 100% of their inputs from other firms within the complex. The input linkages within the state Bahia are of a totally different magnitude: only 21% of all firms purchased part of their input from firms located outside the complex in the state Bahia. This is not surprising since the degree of industrialization of the state Bahia is very low. Besides the petrochemical complex of Camaçari, the only industrial area of significance is the Centro Industrial de Aratu (Industrial Center of Aratu, CIA), where the majority of firms are non-chemical producers, which lessens the possibility for linkages with Camaçari-based firms. Linkages with supplier firms in other states of Brazil were more significant: 64% of the Camaçari firms obtained certain inputs from firms located in other states. Most of these supplier firms can be found in the southern states. The import of input is rather modest: only 30% of the firms imported a very small percentage of the total input they used.

Table 5.5. The origin of resources of the firms functioning on the petrochemical complex of Camaçari in 1989 in number of firms and in percentages

	complex		state		Brazil		imported	
% of the input	*	%	*	%	*	%	*	%
0	7	16	33	79	15	36	29	70
01-25	4	9	3	7	18	43	10	24
26-50	5	12	0	0	4	9	0	0
51-75	2	5	2	5	3	7	0	0
76-100	24	58	4	9	2	5	3	7
total	42	100%	42	100%	42	100%	42	100%

source: firm survey 1989

* = number of firms

5.5.2. Market destination of the production

Another linkage that is of importance when investigating the influence of the complex on regional development is the destination of the goods produced. Of all firms, 69% did not sell their output in the complex itself but elsewhere. This 'elsewhere' was not within the state Bahia; only half of the firms sold part of their production in Bahia. However, this part was very small; in 62% of the cases, the production sold in the state was less than 10% and only 9% of the firms sold more than half of their total production in the state. More than half of the firms marketed at least 65% of their output in other states, mostly in the industrial south of Brazil. Besides the internal market, the external market is also of significance. The export of chemical products is increasingly important. As described in chapter 3.4.3., and as can be seen in table 5.6., the petrochemical industry increased its exports considerably after the economic crisis of 1982. In 1988, the vice-president of COFIC expected to increase exports to 1,5 billion US dollars within the next few years.[42] Due to an increase in petrochemical exports the export composition of the state Bahia as a whole changed significantly after 1981. Until that year, Bahian exports were predominantly agricultural, consisting mostly of cacao and tobacco. While in 1979 the petrochemical exports were only 3% of all state exports, in 1987 this figure increased to 24% and petrochemical products must now be considered one of the most important export products of the state.[43]

Table 5.6. Exports from the petrochemical complex of Camaçari between 1979 and 1987, in US dollars and as percentage of total exports from the state Bahia*

year	value (1.000 US$)	complex/Bahia
1979	33.833	3%
1980	82.575	8%
1981	234.145	21%
1982	243.565	21%
1983	287.767	21%
1984	349.177	21%
1985	298.336	18%
1986	212.443	18%
1987	300.370	24%

source: COPEC 1988

* the total value of exported products for the state includes those of the petrochemical firms located on the CIA complex like Dow Chemical.[44]

Of all 43 firms included in the firm survey, 72% exported part of their production in 1988. The percentage of exported products was modest, however: almost two thirds of these exporting firms exported less than 25% of their product and only 13% exported more than half. The importing countries cover the globe, although a large number are located in Europe, where the most important single importer of petrochemicals from the petrochemical complex can be found: the Netherlands.[45] In 1987, one third of the total export of petrochemical products produced in Camaçari was transported to the Netherlands. The US occupied the second place with 19% of the total export. The 12 other most important importing countries for the complex were, in order of decreasing importance: Argentine, India, China, Japan, Taiwan, Colombia, Iraq, Peru, Belgium, South Africa, Chili and Australia.[46]

From these input and output figures it can be concluded that the petrochemical complex is a highly integrated entity with very limited production linkages within the state of Bahia. Recalling the words of the Shell director: most inputs indeed originated from the complex itself or from other states in the south of Brazil while most of the products were either sold to other states or exported.

Photograph 7: Special transport service increases labour costs substantially

Photograph 8: Indirect employment opportunities on the Camaçari complex: selling ice cream

5.5.3. Employment figures

Another assumed beneficial influence on regional development, generated by the petrochemical complex of Camaçari, was the provision of a large number of employment possibilities. Although petrochemical firms are much more capital intensive than labour intensive, the impact of the chemical firms in the complex on employment in Bahia was, nonetheless, considerable.

Due to the high demand for labour resulting from construction of the complex, two different migration streams could be discerned. The first migration stream occurred during the implementation phase of the complex and consisted of unskilled labourers from the deprived agricultural areas in the northeast. Thousands of 'nordestinos' moved to the village nearest to the complex: Camaçari. The abundance of jobs in the construction industry secured employment for a large number of these migrants. After the initial construction period, which lasted more or less 5 years, the first firms began production and the labour situation changed drastically. The petrochemical industry demanded relatively highly skilled labour while the construction industry used unskilled workers only. Due to the low educational level of the construction workers, they could not easily be trained for employment in the petrochemical industry which resulted in high unemployment in the town of Camaçari. Originally a tiny village with less than 12 thousand inhabitants, Camaçari changed within a period of 10 years into a heavily populated area with more than 120 thousand inhabitants.

The second stream of migrants consisted of skilled employees coming from the south of Brazil to Salvador, the state capital of Bahia. All technicians and engineers working on the complex live in Salvador and commute daily to and from the Camaçari complex. The construction of a new housing area in the vicinity of the complex especially for the higher paid employees did not change this daily commuting. The employees were not attracted by the idea of living in a new town with few entertainment and recreation facilities. Therefore, most firms provide their employees with daily transportation. Private bus companies provide a shuttle service between Salvador and the complex, twenty-four hours a day.

Although the petrochemical industry is characterized by high capital intensity and relatively low labour intensity, the total number of labourers employed in the complex is quite high. In 1985 a total of 19,179 persons were employed in firms located on the complex. In 1989 this figure increased to 22,975.[47] In addition to these employees a considerable number works in subcontracted firms on the petrochemical complex such as the bus companies, cleaning services, security services and catering services. It is estimated that the number of indirect employees reached 20,000 persons in 1987.[48]

With respect to the total number of employees per firm, the majority of the Camaçari firms, 55%, employed between 101 and 400 employees. The average figure for all chemical firms in Camaçari was 468 employees per firm but for the fine chemical industry the average was somewhat lower, i.e. 220 employees per firm. The plastic transformation companies are clearly labour intensive: the two plastic

producing companies on the complex employ, respectively, 550 and 1000 employees. The largest firm and the smallest firms on the complex do not belong to the petrochemical sector. The largest firm on the complex, based on employment figures, is the metallurgical firm, Caraïba Metais, with 2260 employees and the smallest firm is the fine chemical firm, Liquid Carbonics, with 50 employees.

As stated earlier, employees in the petrochemical industry have a rather high level of education. The number of unskilled workers is small relative to the number of technicians and engineers. All but two firms said they employed between 2 and 90 engineers in 1989. About three quarter of the firms employed between 2 and 27 engineers.[49] All firms, with the exception of three, employed between 3 and 483 technicians. Some managers stated that all their employees were technicians, because they would be of no use if they had not completed some sort of technical education. Of the total number of firms, 75% employed between 3 and 150 technically educated employees.[50] Given the large number of transnational firms in the complex, it was to be expected that many of the skilled technicians would be expatriates. In most of the firms, however, the number of foreign employees (besides the directory) was not very large. Foreigners were only employed in 13 firms and in most of these the number was limited to one. In general, the foreign employees came from other Latin American countries like Chile and Argentine rather than the country of origin of the foreign partner. Occasionally, a technical expatriate could be found, for instance in Politeno, a tripartite joint venture with the Japanese Sumitomo.

5.5.4. Decisionmaking centers

To complete the picture of linkages by the petrochemical complex within the state Bahia it is necessary to investigate the extent to which decisionmaking processes take place or are coordinated inside the state itself. Decisionmaking processes, however, cannot be understood without explaining the power structures within the firms. The lowest level of decisionmaking is formed by the management board of directors of the individual firms. In general, this management board consists of three to five executives of which the most important executive is the general manager or superintendent, assisted by a vice general manager. Responsibilities are restricted to the daily operation of the enterprise. All matters relating to daily production, such as maintenance of the machines, human resources, commercial activities, and coordination of infrastructure, are dealt with by these executives. While the managing directors are responsible for the daily operation of the firm, more far-reaching, strategic decisions are taken at a higher level in the firm structure by the board of directors. Strategic decisions are discussed here. All partners to a joint venture are represented in the board of directors, according to a division that is agreed upon by the respective partners.

The management structure described above has certain implications for the decisionmaking process and the influence of the state of Bahia on firm decisions. Strategic decisions are most often taken in the head offices of participating firms.

Since most partners to the joint venture firms have their head office in Brazil's industrial south, the decisionmaking center of the Camaçari complex is also located in the south of Brazil: sometimes in Rio de Janeiro but more often in São Paulo. The head office of Petroquisa, for example, participating partner in 38% of the firms, is located in Rio de Janeiro. The offices of Mitsubishi and Ipiranga can also be found in this state capital. Even one of the firms from Bahia, the Mariani group, has its head quarters in Rio de Janeiro.[51] The head offices of participating firms located in São Paulo are numerous. The national companies Unipar, Ultra, Cevekol and the foreign firms Shell, Dow, Rhodia, Dupont, Idemitsu and Sumitomo are located here, to mention only a few. Another indication that important decisions are taken in the south of Brazil or in the capital Brasilia is the fact that institutions that can play a role in these decisions, such as the BNDES, CIP, SDI and CNP, are all located outside the northeast. Most of these institutions are located either in Rio de Janeiro or in Brasilia. Furthermore, the most influential private institution of the petrochemical industry, ABIQUIM, is situated in São Paulo.

Most of the actors that are of importance in the decisionmaking process relating to the Camaçari petrochemical firms can be found in the south of Brazil. As a result, most of the strategic decisions with respect to the development of the petrochemical firms are not taken in the petrochemical complex itself nor in Salvador. Consequently, the influence of the state of Bahia in decisionmaking processes of the firms located in the complex is limited.

5.5.5. Technology linkages

The last linkage that is of importance with respect to regional development is the linkage to technological institutions. Due to the rather high technological requirements of the petrochemical complex, it was expected that the location of the complex would have a positive influence on the level of technological knowledge within the state of Bahia. To a certain extent, development of the complex has indeed stimulated research possibilities as is shown by the R&D programme of COPEC: in this R&D programme every firm located on the complex is obliged to pay a certain percentage of its annual turnover to COPEC who further distributes this donation to R&D centers located in Bahia. One of the centers that took advantage of this arrangement is the research center Ceped.[52] Ceped was created in 1971 in the state capital Salvador, at the instigation of the local government. At the time it was financed by the federal government. The aim was to establish a training center for the local population in order to support industrial development in the northeast of Brazil. When the petrochemical complex was constructed, Ceped was transferred to the industrial area of the complex. From that moment on, part of the R&D was financed by the chemical firms in the complex and was executed for these firms. Most of the research of Ceped is dedicated to process improvement and chemical analysis. In 1988 the total number of people working in this research center numbered 758. Because of the relatively low wages it pays, Ceped encounters

some difficulties in finding technical researchers. Many experts, among them several foreign scientists, were attracted by the rather high salaries in the petrochemical firms and quit their research jobs for an executive job.

Besides the Ceped, the research and educational programme of the University of Salvador has also been stimulated by the existence of the petrochemical complex. At the Federal University of Bahia (UFBA) several faculties specialize in technological and engineering education and for some students of these faculties the possibility exists to obtain training in one of the firms in the complex. On the other hand, some executives of these firms give lectures at the university. In this way, practical experiences can be transferred to engineering students. The organization of congresses and seminars in the Bahian region has further stimulated technological development. An example of this was a congress concerning automatization processes organized by the UFBA in September 1989. A congress like this would never have been organized in Bahia without the firms in the complex or at least their sponsorship.

However, if the overall impact of the petrochemical complex on technological development in Bahia is examined, the outlook is not too bright. Only half of the firms included in the firm survey said they have some relations with state universities or the state R&D center, CEPED. When asked about the nature of these relations the answers were very unclear. Although firms sometimes have technical trainees from the university, fundamental research, such as process innovation, was not carried out at all by university researchers. In fact, several executives characterized the educational standard of the university as mediocre. In a way the same can be said about the Ceped. Only 13 managers claimed to have relations with this research institute. In most cases the managers referred to the official agreement of the coordinating committee, COPEC, to distribute part of its contribution from the chemical firms in the complex to Ceped. Only a few firms said that they regularly use the possibilities offered by COPEC to perform chemical analyses. These analyses were mostly used to remove bottlenecks in the production process. In sum, despite the creation of the petrochemical R&D programme, Ceped does not seem to have a considerable impact on local R&D activities.

It is remarkable that R&D was not considered very important by the individual petrochemical firms of Camaçari.[53] From the firm survey it appeared that almost no fundamental research had been executed within the complex. Most R&D beyond application and removing bottlenecks, was done either in Brazilian research centers of the participating companies, or, more often, in the R&D center of the participating foreign firms.[54]

It appears that foreign managers in particular did not see any necessity in executing R&D in their subsidiaries and even less when these subsidiaries were located in backward regions of Third World countries. The executives of the foreign firms claimed that the technological level of the region was too low, universities were not compatible with their own level of research and well-educated researchers were not available. Thus they concluded that the research climate was not sufficient. in addition the 'reserved market' introduced in 1982, restricted the import and

production of computers and additional products.[55] This policy made it difficult for transnational subsidiaries located in Brazil to synchronize R&D all over the world. It was mentioned several times that the obligation to buy Brazilian hardware seriously hampered communication processes between different subsidiaries of foreign firms.

A problem mentioned several times by executives of foreign firms was that transnational firms are afraid to loose control over their newly developed technologies. A director of the French-based Rhodia complained:

> "There is almost no country in the world where patent rights are so badly protected as in Brazil".[56]

The bad reputation of Brazil regarding international patent rights played a considerable role in the decision of the foreign partners to locate most of the research of joint ventures involving transnational participation in Western-based R&D centers. It can be concluded that most technology linkages of the petrochemical firms of Camaçari were established in institutions outside the state of Bahia. The technological potential of Bahia appeared to be too limited.

5.5.6. The contribution of value added taxes (ICM taxes)

Supporters of the Camaçari location for the petrochemical complex stress the positive impact of the complex on development of the region given the high amount of value-added tax, (ICM[57]) generated by the complex what can be used for development projects in the region. No doubt a considerable amount of tax is generated by the complex: of the total amount of ICM in Bahia in 1988, 30% came from the petrochemical complex.[58] Copene, for instance, which is responsible for 24% of the total turnover of the complex, generated 80 million US dollars of ICM in that year.

Although it cannot be denied that the complex generated large amounts of ICM, given the distribution of these resources less regional development is stimulated than many would like to make us believe. In the first place, part of the ICM is allocated for infrastructural works in the complex itself. For the expansion of the petrochemical complex alone, the state will have to pay 120 million US dollars. Secondly, a considerable part of the ICM goes to the village of Camaçari; next to the state capital Salvador, Camaçari is the largest consumer of ICM resources. This is not surprising given the problems of this former tiny village such as the tremendous increase in its inhabitants. By 1988 six new families were still arriving daily in search of employment. The majority of the inhabitants, 70%, migrated to Camaçari from other areas of Brazil. Almost the entire population of Camaçari, 90%, earns an income between 0 and 3 minimum wages, and an equal percentage have not completed a primary education.[59] For these people it is almost impossible to obtain employment in the modern sector of the economy and, therefore, they depend largely on the informal sector. The town itself is not equipped to absorb such large numbers of inhabitants. As a result there is an enormous shortage of social and infrastructural facilities. The only hospital in Camaçari is in a lamentable state; not

surprisingly, infant mortality is among the highest in Brazil. Another problem Camaçari and its surroundings have to deal with is the environmental pollution caused by the petrochemical firms. Not much research has been done with respect to this, but no doubt the levels of surface, water and air pollution are of considerable magnitude. Despite the fact that Camaçari obtains a relative high percentage of ICM, it is not enough to compensate all of the problems caused by the petrochemical complex.

It seems that the only place in Bahia that has received benefits from the creation of the complex is the state capital Salvador. Not only is a considerable amount of ICM destined for Salvador, but also a large number of skilled employees from the petrochemical firms live in this city. The salary of these highly skilled employees and, consequently, their consumption level, is much higher than that of inhabitants living in Camaçari. The impact on the community has been great. Before the petrochemical complex was constructed, no large shopping center could be found in Salvador. Nowadays the happy few of Salvador can choose between several paradises of luxury consumption. Fifteen years ago, Salvador consisted of a colonial center, a commercial center near the harbour, a relatively small corridor of more or less reasonable apartments, and a large area of deprived slums. Nowadays, along the extended beaches large luxury neighbourhoods have been created, providing space for the wealthy employees of the chemical firms. Because of the capital accumulation of the Bahian-based chemical firms and because of the high demand for precious houses, hotels and shopping centers, the construction industry in Salvador has boomed. Also, the impact of the complex on the cultural atmosphere of Salvador has been considerable; the increase in the number of well-to-do people who are used to the cultural level of São Paulo and Rio de Janeiro has stimulated the creation of theatres and increased the number of musical performances.

It is doubtful whether one can speak of regional development. The people that benefitted from the creation of the complex are not the large number of poor inhabitants from the northeast of Brazil. For them there are only limited opportunities for employment in the chemical firms -only the lower paid jobs in subcontracting firms are reserved for them. They do not have money to spend in the luxury shopping centers; they cannot afford to live in the wealthy new apartments; and they cannot attend musical performances. Of course, some possible spillover effects will without any doubt reach a few of the poor Bahianas. The construction contract workers and labourers, the housemaids and the shopkeepers all have a clientele they could not dream of fifteen years ago. On the other hand, the employment opportunities in subcontracting firms or in the informal sector, as limited as they are, also have negative side-effects. Many people living in the impoverished rural areas are still attracted to and migrate to the state capital. As a result, the number of slums in the city continues to increase, the unemployment level is rising and inflation is among the highest in Brazil.[60]

The future prospects for the regional development due to the petrochemical complex are also not very bright. Firstly, the expansion of the complex is not likely to result in an increase in employment opportunities. Most of the firms will expand

their capacity by improving production processes or will develop new products out of formerly useless by-products. Both types of expansion do not generate a large increase in labour input. Secondly, the amount of ICM received by the state will diminish in the near future. The orientation of petrochemical firms is going to shift towards export markets, while ICM is only levied on internally commercialized goods. For the Camaçari firms, the export figure will further increase when the Rio de Janeiro complex is finished. This complex will be located in the industrial south and the vicinity of the markets will make its products much cheaper. The harsh competition that may result from this, will force Camaçari to increase its exports. For the petrochemical firms this could be an advantage if export prices are higher than internal prices, but the income of the state will certainly suffer from this market shift. Instead of a more equal regional distribution of wealth, the creation of the Camaçari complex resulted in the creation of a rich enclave within an increasingly impoverished state.

5.6. Summary and conclusions

To gain a clear understanding of the functioning of the tripartite model in the Camaçari complex, it is necessary to outline the characteristics of the chemical firms on the complex in more detail. A first important aspect to consider is the fluctuation in number of firms located in the complex. There is a noticeable increase in the number of firms in the ten years the complex has been functioning. Many of the new firms do not belong to the downstream petrochemical branch, however, but to the fine chemical branch. In 1989 almost half of the operating firms in Camaçari were fine chemical firms (the category with the largest increase in number), plastic transformation companies and non-chemical, sector related firms, such as construction and metallurgical companies.

Despite the unfavourable economic situation in Brazil during the eighties, the performance of the petrochemical firms of Camaçari has been satisfactory. In 1988 the average turnover of 38 Camaçari companies was 82.4 million US dollars for the downstream petrochemical firms, 22.2 million US dollars for the fine chemical companies and 28 million US dollars for the plastic transformation industry. The profit figures that were registered in 1988 were also quite high. The downstream petrochemical firms in particular were responsible for these high figures. Of the fine chemical enterprises the figures were either not available, due to production problems, or they were negative. When the profitability of the Camaçari firms is compared to the average profitability of all chemical companies in Brazil, the Camaçari firms perform better than the national average. For 1989 the profitability of the Camaçari firms proved to be 2% higher than the national index. A similar phenomenon can be seen when successive years are compared. Although the profitability figures of the Camaçari firms fluctuated more than the national figures,

their average profitability for the years 1983-1989 was higher than the national average.

The satisfactory performance of the Camaçari companies is reflected in their anxious desire to expand. As part of the National Petrochemical Programme, 34 companies located in the Camaçari complex will expand their production capacity or are planning to produce other chemical intermediaries. The financial capital input of these investments, a total of 1.2 billion US dollars, is not considered a problem since, on the average, 40% of these investment can be provided by the firms themselves. The remaining 60% comes either from the National Development Bank and other development organizations, or from external sources. The Brazilian government will provide 300 million US dollars.

The most remarkable characteristic of the Camaçari firms is, of course, their specific ownership structure. In the majority of the companies more than one shareholder is responsible for the capital investments and, as a result, different ownership structures, such as tripartite joint ventures, bipartite joint ventures and 100% owned firms, can be found side by side. Often the voting shares are more or less equally divided between the various partners, which does not mean that the financial inputs of all partners is in accordance with this division. The largest part of the capital invested in the Camaçari complex comes from the federal government, either by the direct participation of state-owned companies, or by means of cheap loans and credits supplied by the National Development Bank, BNDES, and the Development Corporation, Sudene. The foreign companies contributed technologically and their financial input was negligible.

Certain characteristics of the Camaçari firms are important for the impact of the complex on regional development, which was one of the government objectives in implementing the Camaçari complex. Several different aspects have been considered in this chapter - the input/output linkages, the employment possibilities, the location of decision making centers and R&D centers and the contribution of value added taxes - in attempt to measure the development potential of the complex.

After considering the different kinds of linkages of the petrochemical complex within the state of Bahia, it is not possible to speak of a positive contribution to regional development. The large and integrated character of the complex, on the one hand, and rather recent industrialization in the state of Bahia on the other, make the complex a rich, well-developed enclave in an increasingly underdeveloped region. Most of the inputs of the firms located on the complex come either from the complex itself, or from outside the region. The lack of sufficient demand obliged the Camaçari firms to sell the largest part of their output to the industrial south of Brazil. Because of the high capital intensity of the petrochemical industry, employment possibilities proved to be rather limited as well. Although the number of indirectly employed - working for example, for bus companies, catering services and cleaning companies - is more or less the same as the number of directly contracted employees, the wage differences between these two groups are considerable. Approximately 40,000 employees were able to obtain a job in the chemical firms or service firms of the complex, leaving thousands of former construction workers and

unskilled migrants unemployed. Attracting labour-intensive industry did not prove to be a solution either. The rather high labour costs on the complex forced the labour intensive plastic transformation companies to look for other locations outside the complex. All important decisions concerning the companies are taken outside Bahia, in the headquarters of the participating companies in Rio de Janeiro, São Paulo or in the state institutions of Brasilia. Due to recent technological tradition within the state of Bahia, technological linkages between the Camaçari firms and Bahian institutions, such as the university and the CEPED, have been almost non existent. Finally, one positive aspect for regional development, the large increase in ICM tax, can largely be neglected because the largest part is distributed to problem areas around the complex, like the town of Camaçari.

In summary, the petrochemical complex of Camaçari has been a large success in regard to economic performance particularly of the downstream companies. The regional impact has been rather disappointing, however. It would be interesting to examine whether these positive financial figures imply that the tripartite model is functioning satisfactory.

Notes chapter five

1. P. Evans, Collectivized capitalism: integrated petrochemical complexes in Brazil and capital accumulation, in: Bruneau T.C & Ph. Faucher (ed) Authoritarian capitalism, Boulder; Westview Press; pp 85-123, 1981.
2. Part of the quantitative data comes from the Coordinating Committee of the Petrochemical Complex, the COPEC and includes firm figures for the years 1979, 1980, 1985 and 1989. Comparison between COPEC data for different periods is not always possible because different variables have been used in the census. For this reason, the number of firms in the tables is not always the same and certain tables and analyses will only cover one or two successive years. Another portion of the quantitative data is obtained from the 'Quem é Quem na Industria Brasileira', an annually published edition of the magazine Visão in which different figures of all important companies located in Brazil, distilled from annual reports, are compiled. When not stated otherwise, the quantitative and qualitative data used in this and the following chapters come from in-depth interviews and firm questionnaires held in 1989.
3. A direct pipe connection between the harbour of Aratu and the petrochemical complex transfers cargo that has to be transported by sea vessels.
4. This exception, Companhia Quimica de Reconçavo, (CQR) was until that period located in a densely populated area of Salvador. When the firm directory wanted to expand the firm, the local government, afraid of more pollution and the danger of explosion, did not agree. The firm had to relocate the factory to an appropriate place which was found in the complex of Camaçari.
5. The number of cancelled firms refers to those firms that did not start construction in July 1989.
6. Three of the eight new firms were not on the project list of 1988.
7. Several managers of the petrochemical firms in the complex even advice their clients not to settle in their vicinity, on the petrochemical complex itself, but to look for a location near large population centers like Salvador.
8. COPEC, Avaliação dos dez anos do COPEC; a Tarde, 11-10-1983.
9. Sometimes this unsatisfactory result was due to an unwillingness on the part of the respondent to provide the exact answers, sometimes the desired data were not directly available or could be obtained only at the headquarters of the company.
10. Net profit is measured as a percentage of the annual turnover plus the reserves plus/minus the accumulated profits/losses.
11. The CIP; Conseilho Interministerial de Preços (Interministerial Council of Prices) was created with the objective of controlling the high inflation rate of Brazil by regulating prices. The CIP can decide to 'cipeate' the prices which means that they are frozen for a certain period of time. Price increases must be negotiated every now and then.
12. Metacril is a petrochemical company located in the industrial center of Aratu, CIA.
13. Diario Oficial da União; 3-11-1988, pp 148-151.
14. Revista Petro & Quimica; Camaçari, projetos de ampliação são estudados pelo CDI, setembro 87, pp 20-36 (p 24).
15. Revista Petro & Quimica; Camaçari, projetos de ampliação são estudados pelo CDI, setembro 87, pp 20-36 (p 20).
16. The 'Revista Petro e Quimica' mentioned a figure of 40%, from the firm survey a more or less equal figure can be distilled. Of the 25 firms that answered the question, 40% claimed to finance their expansion completely out of their own resources.
17. Most petrochemical firms are highly capitalized. Firstly, the state guaranteed their profits by controlling the input as well as the output prices. Secondly, the initial credits and loans could be serviced on favourable terms. Thirdly, hardly any capital is spent on technological development. And finally, in the first 15 years almost no expansion in the petrochemical branch was possible. Although many entrepreneurs started investing in other activities, transferring their profits to attractive investment funds or send it abroad, much capital was still available when the expansion of petrochemical activities became reality.
18. Jornal da Bahia, 29-6-1988.
19. PET chemicals, of which the full chemical name is poly-ethylene-etere-ftalato are used in the production of plastic disposable bottles, like the one liter bottles of coca cola.
20. It proved rather difficult to define these sources. The various government agencies

involved presented large amounts of figures and statistics, none of which really covers the whole scope of investments, and the reliability varies. The firm survey held in 1989 encountered other difficulties, varying from ignorance about the exact data to unwillingness to answer such delicate questions. For the analysis, the financial part of the COPEC data and the firm survey of 1989 are used although the questions with respect to the origin of capital were answered by only 29 firms. Aggregated data are furthermore distilled from statistical material of the COPEC, the development bank, BNDES, and the development organization, SUDENE.

21. COPEC, Profil das empresas, annual report 1985, Camaçari.
22. COPEC, Profil das empresas, annual report 1988, Camaçari.
23. In absolute terms the financial contribution of the transnational corporations in the petrochemical complex of Camaçari was in 1987 slightly more than 81 million US dollars. Copec, revisão e atualização do plano diretor do Copec, Jan 1987, vol 2.
24. Evans, P. 1979, p 97.
25. Because the political involvement of the BNDES is already described in chapter 4, in this chapter the emphasis will be on the financial role of the BNDES in the Bahian complex.
26. FINAC; Programma de Financiamento a Acionistas; the financing program for shareholders.
27. Annual inflation increased after 1973. While the rate before this year was 15.5% , it more than doubled to 34.6% in 1973. In 1979 the inflation further increased to 77.2% and just before the economic crisis of 1982 it reached 110.3%. Luiz Bresser Peireira; Desenvolvimento e crise no Brasil 1930-1983; ed Brasilense, São Paulo, 1987, p 225.
28. The three subsidiaries were FIBASE, EMBRAMEC AND IBRASA. Sergio Faria Alves de Assis, a petroquimica e o desenvolvimento economico, BNDES, Rio Grande do Sul, undated.
29. An effort to privatize the huge company only partially succeeded: at present 67% of all assets are in the hands of a national private group, Dias D'Avila, while the remaining assets are still controlled by the BNDESpar.
30. Only petrochemical firms producing intermediaries depend on the output of Copene, which makes participation of Petroquisa in these firms desirable.
31. To the basic production goods sector belong the following industrial branches: mineral production; metallurgical industry; siderurgical industry; fertilizers; paper and cellulose and chemical industry. This industrial sector obtained the largest part of all BNDES loans in the seventies and the eighties. In 1983 74% of all BNDES loans went to this sector.
32. Annual reports of the BNDES: 1974 till 1982, Relatorio de Atividades do BNDES 1983.
33. PIS/PASEP; Programmas de Integração Social / Formação do Patrimonio de Servidor Publico; Programme of Social Integrating/ Formation of Patrimony of Public Services.
34. The COPEC data from 1979 and 1987 as well as the 1989 firm survey show the major importance of the BNDES loans.
35. The SUDENE region consists of the states of Bahia, Sergipe, Alagoas, Pernambuco, Paraiba, Rio Grande do Norte, Ceara, Piaui, Maranhão, part of Minas Gerais and the federal territory of Fernando de Noronha. SUDENE, Fiscal and financial incentives for investments in Northeastern Brazil, Recife, 1981.
36. FINOR; Fundo de Investimentos do Nordeste, the Northeast Investment Fund.
37. SUDENE; Ministry of Interior; Banco do Nordeste do Brasil Sa; Fiscal and financial incentives for investments in Northeast Brasil, Recife 1981.
38. FINOR loans are not given at the beginning of the construction of a factory, but they are provided over a certain period of time. When during this period no shortage of financial capital appears, the firm can chose not to use its FINOR application.
39. Because of its capital intensiveness, the petrochemical industry is very difficult to relocate.
40. Interview director Shell, May 1988, São Paulo.
41. COPEC, Perfil das empreses, 1985, Camaçari.
42. Relatorio de Gazeta Mercantil, 25-27 June 1988, p 1.
43. Desempenho da Conjuctura, junho 1988, issue 1, no 1, p 22.
44. In 1988 40% of the total production of the petrochemical complex was exported. Jornal da Bahia, 29-6-1988, p 5.
45. In 1984 the following firms exported part of their production to the Netherlands: Copene, Deten, EDN, Nitrofertil, Polialden and Politeno; COPEC, Perfil das empresas,

1988, Camaçari.

46. Jornal da Bahia, 29-6-1988, p 5.
47. COPEC, perfil das empresas, annual report 1985, Camaçari and firm survey 1989.
48. Desempenho da conjunctura, junho 1988, issue 1, no 1, p 15.
49. This question was answered by 34 managers of petrochemical firms. Nine managers did not know the exact number of engineers employed in their company.
50. In this case the question was answered by 36 managers of petrochemical firms. Seven managers did not know the exact number of technical employees working in their company.
51. The other two firms of Bahian origin; Odebrecht and Banco Economico, have their office in the state capital Salvador.
52. CEPED: Centro de Pesquisa e Desenvolvimento, Research and Development Institute.
53. In chapter 6 this aspect will be described in more detail, here only a comparison of the technological linkages of the firms within and outside the region will be analyzed.
54. The exact figures concerning R&D will be given in chapter six.
55. With the introduction of the 'reserved market' it was no longer allowed to import mini and micro computers in Brazil, nor were foreign firms allowed to produce them in Brazil.
56. Interview director Unipar, June, 1989, São Paulo.
57. With ICM, 'Imposto sobre Circulação de Mercadorias' the value added tax is meant.
58. Jornal da Bahia, 29-6-1988, p 9.
59. Ibid.
60. The prices of consumer goods are higher in Bahia than elsewhere in Brazil, on the one hand because of the distance to the industrial areas and, on the other, because of the high demand.

6

LIMITATIONS OF THE TRIPARTITE MODEL IN THE PETROCHEMICAL COMPLEX OF CAMAÇARI: ORIGIN AND CAUSES

6.1. Introduction

In the previous chapters, the development of the Brazilian petrochemical industry was described with special emphasis on the role of the tripartite model in the Camaçari petrochemical complex. In this chapter, the functioning of the model will be analyzed in order to measure its success or failure in Camaçari ten years after the first firms started to function. Furthermore, reasons for possible limitations will be analyzed. Two aspects are considered of importance:

The first aspect is joint venture stability. From the description in chapter 2.8. regarding the functioning of joint ventures, the importance of the stability of joint venture structures for questions of firm performance and development became apparent. It was concluded, amongst others, by Beamish, that in general stable joint ventures have a more positive impact on the development of Third World countries than unstable joint ventures. Because the tripartite model in Camaçari consists of bipartite and tripartite joint venture structures, it is important to pay attention to the stability of these ownership structures. Special reference will be made to the changing participation of foreign transnationals in the Camaçari complex. When joint ventures have fallen apart or the composition of their shareholders has changed, in most cases the reasons for this can be found in the relationship between the partners. Among researchers as well as managers, the comparison between a joint venture structure and a marriage is quite common: "when the respective partners of the joint venture can no longer cope with each other, it is better to separate." This chapter will examine the reasons for these separations; which partner was to blame for the trouble or are there other, external reasons for the failure of the marriage. Special attention will be paid to differences that can be observed between Japanese, American and European participants.

The second aspect is the degree of technology transfer. Although technology transfer is not the main objective of the Brazilian government, it did play an important role in the decision to use the tripartite model in the establishment of the petrochemical complex of Camaçari. It was thought that the model would have a positive influence on the transfer of technology and could stimulate nationally controlled R&D. In section 6.4. findings from previous research with respect to this subject will be presented, followed by results from present research. To measure the degree of technology transfer, three phases in this transfer will be dealt with successively: the origin of the first used technology, the actual investments in R&D in the adaptation phase and the origin of the technology needed for expansion of

the production capacity of the firms. Technology transfer is often seen as a crucial factor in the industrialization process of a developing country. It is, therefore, important to ask why the transfer of technology in a model, which seemingly possessed all the necessary characteristics for stimulating a more or less smooth process of transfer, turned out to be so limited. Given the existence of three partners it is logical to pay attention to the role of these respective participants in the process of technology transfer. In this way, more insight will be gained into the factors responsible for the limited transfer. Therefore, the role of the national participants, the state participant and the foreign partners will be analyzed. With respect to the latter, a further question is whether differences can be noticed between the behaviour of Japanese, American and European transnationals towards technology transfer.

6.2. The unstable ownership structure of tripartite and bipartite joint ventures

In chapter 5.4., the ownership structure of all petrochemical firms located in Camaçari is described. From the list of firms that was presented, it appeared that in 1989 different types of ownership existed side by side. To understand the functioning and impact of the tripartite model, it is necessary to know whether and to what extent the presence of these different ownership structures in the Camaçari complex changed after it came on stream. A comparison of data regarding all firms, from the moment they started their activities in the petrochemical complex until 1989, will provide a comprehensive view of the dynamics of the tripartite model. It may also show the usefulness and stability of the model.

6.2.1. The fading popularity of tripartite joint ventures

In table 6.1. the ownership structure of the increasing number of firms in the period between 1979 and 1989 is looked at in order to identify existing patterns.[1] It is clear that some remarkable changes occurred in this period. Changes in ownership structure can take place in two ways: in the first place, an increase in the absolute number of firms influences the relative importance of each type of ownership structure. In the second place, the ownership structure of the existing firms is subject to changes when one of the partners decides to sell its voting shares.[2]

The most remarkable change in the Camaçari complex was that the relative number of tripartite joint ventures declined considerably. While in 1980, 42% of all firms had a tripartite structure, the percentage dropped to 19% by 1988. The absolute decline in the number of tripartite firms -only two- was not that large, however. In 1989, three new tripartite firms were created. One of these new tripartite firms was Nitroclor, a fine chemical firm with the partial ownership by the

Italian transnational, Liquipar. The other two 'new' tripartite firms were not newly created but already existing firms that experienced a change in ownership structure towards a tripartite joint venture such as the nationally owned firm, Sansuy do Nordeste. Part of the assets of this plastic consumer goods producing company were bought by the tripartite firm CPC, which wanted to safeguard its nearby market. It is obvious that the total increase in number of firms in Camaçari from 23 to 50 did not result in more tripartite joint ventures. This suggests that the newly created firms in particular were not constructed according to the tripartite model.

The relative decline of tripartite joint ventures resulted in an increase in the relative importance of other types of ownership. The total number of 100% transnationally owned firms increased steadily between 1979 and 1989. In absolute numbers this increase was 7 firms, or from 4% to 16%. In part this increase can be attributed to a change in government policy: it became easier for 100% subsidiaries of transnational firms to obtain permission for the construction of a plant in Camaçari. Examples include the fine chemical firms BASF and Ciba Geigy. In other cases, the increasing number of 100% foreign subsidiaries was due to changes in ownership structure: some firms started as bipartite or tripartite joint ventures but bought out their national partners after a couple of years. Examples of this include Unirhodia and Cobafi, which became 100% affiliates of Rhone Poulenc and Akzo respectively.[3] The other types of firms did experience some fluctuations in absolute importance but in a relative sense no remarkable trends could be detected. In an absolute sense, the importance of 100% nationally owned firms and joint ventures between national private and state firms increased considerably.

Table 6.1. Number of firms located in the petrochemical complex of Camaçari, according to ownership structure, from 1979 to 1989

year /status	1979		1980		1985		1988		1989	
	abs	%	abs	%	abs	%	abs	%	abs	%
TNC	1	4	1	4	5	12	5	12	8	16
JV	3	11	2	7	5	12	7	16	6	12
NJV	4	15	4	14	7	16	8	19	7	14
TRIPE	10	37	12	42	10	23	8	19	11	22
NAT	8	29	8	29	15	35	14	32	17	34
STATE	1	4	1	4	1	2	1	2	1	2
total	27	100	28	100	43	100	43	100	50	100

source: annual reports of COPEC, firm survey 1989

TNC = 100% subsidiary of transnational corporation
JV = joint venture between Brazilian firm and transnational firm
NJV = joint venture between Brazilian private firm and Brazilian state firm
TRIPE = joint venture between a transnational corporation, a private Brazilian firm and a state firm
NAT = 100% Brazilian private firm
STATE = 100% state owned firm

When the number of projected firms is looked at, the tendency towards more nationally owned companies is also obvious. (see table 6.2.) The tripartite model lost much of its popularity: only four tripartite projects were registered between 1979 and 1989. Despite the fact that most of the projects were fully nationally owned, the total number of nationally owned firms did not increase that fast, due to the relatively large number of cancelled projects among this category of firms. In the period between 1979 and 1988 twenty nationally owned firms cancelled their project.

Table 6.2. Number of firms projected and cancelled on the petrochemical complex of Camaçari, according to ownership structure, between 1979 and 1988[4]

year	1979-1980		1985		1988	
/status	P	C	P	C	P	C
TNC	4	0	0	0	0	0
JV	0	4	1	0	1	1
NJV	1	0	1	0	0	0
TRIPE	1	1	2	0	1	0
NAT	6	8	8	3	12	9
total	12	13	12	3	15	10

source: annual reports of COPEC, firm survey 1989

P = projected firms
C = cancelled firms or projects

The explanation for the large number of cancelled projects among nationally owned firms must be sought in the industrial branch. Most of the cancelled projects were not petrochemical projects but projects in the plastic transformation or fine chemical branch. As mentioned earlier, the performance of these two branches was not very successful on the petrochemical complex of Camaçari, which meant that several projects never became reality.

The fine chemical branch in particular was responsible for the failure of most of the projects of the 100% nationally owned firms. Because of the policy of the Brazilian government, the number of national projects in the fine chemical branch increased considerably after 1980. In 1985, 10 projects in this branch were approved by the SDI and in 1988 another 8 projects were added. Almost all of these projects were presented by 100% national firms: in 1985 seven projects were 100% national in character, two were tripartite projects and one was a joint venture between a state firm and a private national firm. In 1988, these figures were only slightly different: five fine chemical projects were 100% nationally owned, one firm was a tripartite and one firm a bipartite joint venture. Fine chemical projects presented by national firms in particular were doomed to fail. Their unsuccessful performance

was primarily due to the difficulties in acquiring technology. As mentioned before, technology in the fine chemical branch is very difficult to obtain. National Brazilian firms that try to construct a fine chemical firm without a transnational partner, which provides the technology, are largely dependent on the 'free' market. This 'free' market is very limited, however. The large chemical transnationals, which spent huge amounts of capital on R&D activities and are in the possession of the most recent technology, are generally not willing to sell this technology. Consequently, the national firms from Camaçari that succeeded in the acquisition of fine chemical technology discovered that this technology - bought from countries such as Mexico, Rumania and Italy - was neither appropriate nor very up-to-date. Another problem that was encountered after the purchase of technology was that the transfer of this technology proved to be very difficult. The famous Norquisa daughter, Nitroclor, provides one example. Although this national fine chemical enterprise had already been in operation for a couple of years, a tremendous number of technical problems was encountered. Because the Brazilians were not experienced with the type of technology that was necessary to produce fine chemicals, they did not know where to obtain this technology. The solution was to ask the Italian Liquipar, which already provided a small part of the necessary technology, to look around on the 'free' market and buy other parts as well. This proved to be a disaster. Liquipar was not experienced with the production process itself and various technical problems emerged.

6.2.2. The shaky alliances of joint venture firms

To what extent can the vanishing popularity of tripartite joint ventures be attributed to the creation of new nationally owned firms and to what extent can changes in ownership structure be held responsible? Of all firms,[5] sixteen managers (38%) stated that the ownership structure of their firm had changed fundamentally since its beginning. These changes varied, for example, between tripartite and 100% transnationally owned or between bipartite and 100% nationally owned. An even larger percentage of managers answered that their firm experienced a change in shareholders: 27 managers (64%). A change in shareholders does not necessarily result in a change of ownership structure. When a foreign shareholder decides to sell its voting shares to another foreign shareholder -for instance, Hoechst sold its 33.3% of the assets of EDN to the US based Dow Chemical- the firm of course remains a tripartite firm.

Which firms in Camaçari are shaky, in other words: which firms are more stable and which firms are more unstable as far as ownership structure is concerned? This can be investigated by relating the changes in ownership-structure to the actual number of operating firms of a specific type. Differences in stability relating to changes in ownership structure between the tripés, the joint ventures and the firms with 100% ownership do not appear to be significant. The joint ventures with participation of state firms experienced slightly more changes; 57% of these firms

experienced a change in ownership structure in comparison to 34% of the other firms and 40% of the tripés. When changes in shareholders are looked at, a different picture can be seen. All eleven tripartite firms experienced a change in shareholders, five of the seven joint ventures with state participation and three of the six bipartite joint ventures. This is in major contrast to the 100% transnationals, of which only three of the eight changed shareholders. As expected, joint venture firms, and especially tripartite joint venture firms, are less stable than 100% foreign owned firms. Before looking at the reasons for the instability of these joint ventures, it is interesting to look more closely at the participation of especially the foreign partner in these joint ventures.

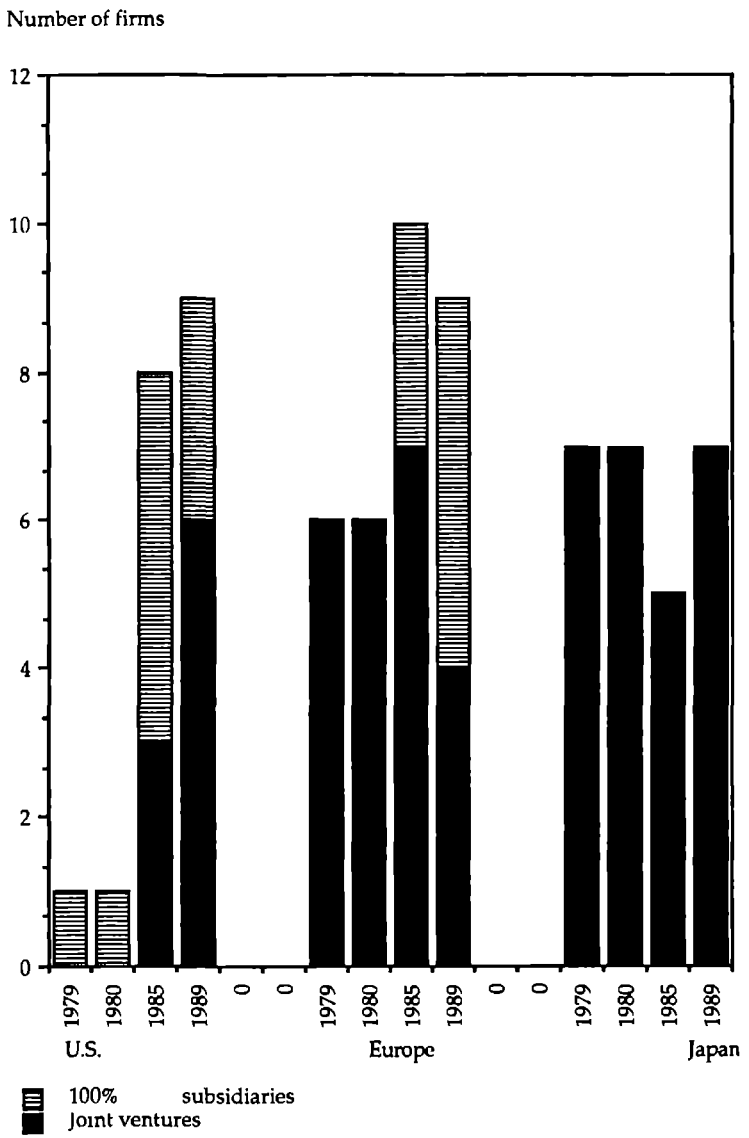
6.2.3. Changes in the participation of foreign firms

Two questions are considered of importance: to what extent is foreign participation subject to changes and to what extent do differences exist between transnational companies based in different countries. Analyzing the figures with respect to the participation of foreign firms for the years that the petrochemical complex has been functioning, some remarkable changes can be observed. At its start, fourteen foreign firms were participating in the complex. Until 1985 this number did not change. In the last four years, however, there has been an increase to a total of 25 foreign firms by 1989. What is the origin of the foreign firms that showed a large interest in the Camaçari complex and what were their reasons for coming to the complex?

First, the relatively large number of Japanese participants is noteworthy. The preference of the state technocracy for Japanese subsidiaries is one reason, included in the description in chapter 4.5.2., for this phenomenon. Despite the fact that Japanese firms were complete newcomers to the Brazilian chemical industry, in 1979 they had seven projects on the Camaçari complex, all in joint venture structures. (see figure 6.1.) Second, the relative absence of American firms is remarkable; in the initial phase of the complex they formed an absolute minority with only one project. Ten years after the creation of the complex this picture has changed considerably. While the number of Japanese investors remained the same -seven Japanese firms in 1979 as well as in 1989- the number of European firms increased from six firms in 1979 to nine firms in 1989, the majority in 100% ownership. The American firms experienced the largest increase: from one firm in 1979 to nine firms in 1989; and, more remarkably, 6 of these participated in a joint venture.

The large number of European and Japanese companies participating in joint venture structures suggests that these transnationals are more positive about this type of ownership structure than American companies. During the ten years Camaçari has functioned, the attitude of American transnationals seems to have changed slightly: in 1979 not one American firm agreed to participate in a minority joint venture in the Camaçari complex, but in 1989 there were six American joint ventures.

Figure 6.1. Participation of transnational corporations in joint ventures and in 100% ownership firms in the petrochemical complex of Camaçari according to country of origin in 1979, 1980, 1985 and 1989



source: COPEC 1979, 1980, 1985, firm survey 1989

European companies show the opposite tendency: six European joint ventures were present in 1979 and seven in 1985, after which the number declined to only four. Joint ventures with Japanese participation remained, aside from small fluctuations, equal in number.

In addition to the changing number of foreign participants from various countries, it is interesting to examine which foreign firms participated in the complex and changes regarding their participation. Figure 6.2. shows clearly that, with respect to Japanese participation, three firms dominate in the joint ventures of Camaçari. After the start of the complex, no new Japanese companies invested. Apart from Idemitsu, which started to participate somewhat later in a joint venture on the complex, Mitsubishi as well as Sumitomo were involved in the very first negotiations. The most important Japanese representative is the chemical conglomerate Mitsubishi Chemical SA. This company participated in 5 of the 17 joint ventures and possesses its own trade firm, which is different from the other Japanese firms, Sumitomo and Idemitsu, which participate together with other trade companies, C. Itoh and Nissho Iwai, respectively. In official documents, the Japanese conglomerates were usually registered as the 'Japanese Group'.

Of the present seven joint ventures in which Japanese shareholders participate, only a few changes can be seen. Mitsubishi decided to leave two firms: the tripartite firm, Copenor, became nationally owned and in the other case, Celbras, the Japanese firm was replaced by the American City Bank. In another firm it was the other way round: when CPC (one of the tripartite joint ventures in which Mitsubishi participates) decided to buy shares of Sansuy, a plastic transformation company, Mitsubishi automatically became one of the shareholders as well. In all the other projects the total percentage of Japanese shares remained the same, 33,3%. In Polialden, the share of Mitsubishi declined from 50% to 33% which gave the state firm, Petroquisa, an opportunity to participate as well.

The characteristics of Japanese participation are in contrast to European and American participation, in which large variations in the firms present can be seen. Only two American joint venture firms did not experience any change; in one case, Nitriflex, because the firm was recently constructed. Three American firms left the petrochemical complex -Celanese, Morton Norwich and IFC- and three new American firms started to participate: Dow Chemical, Dow Corning and the City Bank.

The pattern of European firms fluctuates even more: four European firms left the complex -ICI (in two firms), DSM, Dynamit Nobel and Hoechst- and only one new European firm began investing in Camaçari -Shell, one of the shareholders of Polibrasil. In two cases, a former joint venture with European participation changed into a 100% transnational firm -Cobafi (AKZO) and Unirhodia (Rhone Poulenc). The participating European firm did not change in only three cases: in Acrinor, Rhone Poulenc is still participating, Liquipar still forms part of Nitroclor; and the Belgium firm, Solvay, is still a shareholder of Carbonor. In fact, the latter is the only firm in which European participation remains unchanged, since in Acrinor the share of the foreign partner declined form 45.6% to 35% while in Nitroclor the Italian Liquipar decided to diminish its shares from 30% to 20%.

Figure 6.2. Foreign firms participating in former or existing joint ventures located at the complex of Camaçari, according to country of origin

FIRN NAME	PAST FOREIGN PARTNER	ACTUAL FOREIGN PARTNER, (1989)
AMERICAN PARTICIPATION		
Norcom DuPont	-	DuPont
Oxiteno	IFC	-
Nitriflex	Goodyear	Goodyear
Silinor	-	Dow Corning
CQR	Morton	-
Metanor	Celanese	-
Liquid carbonic	Liquid Carbonic	Liquid Carbonic
EUROPEAN PARTICIPATION		
EDN	Hoechst	Dow Chemical
Pronor	Dynamit Nobel	-
Etoxilatos	ICI	-
Polibrasil	ICI	Shell
Cobafi	AKZO	AKZO
Unirhodia	Rhone Poulenc	Rhone Poulenc
Acrinor	Rhone Poulenc	Rhone Poulenc
Nitroclor	Liquipar	Liquipar
Nitrocarbono	DSM	-
Carbonor	Solvay	Solvay
JAPANESE PARTICIPATION		
Ciquine P	Mitsubishi Kasei	Mitsubishi Kasei
Ciquine Q	Mitsubishi Kasei	Mitsubishi Kasei
CPC	Mitsubishi Kasei	Mitsubishi Kasei
Celbras	Mitsubishi Kasei	City Bank
Polialden	Mitsubishi Kasei	Mitsubishi Kasei
Politeno	Sumitomo	Sumitomo
Policarbonatos	Idemitsu	Idemitsu
Sansuy	-	Mitsubishi Kasei
Copenor	Mitsubishi Kasei	-

source: firm survey 1989

6.3. Reasons for instability: opinion of the managers involved

In order to throw some light on the instability of the Camaçari-based joint venture firms, it is necessary to present the reasons for the changes in ownership structure and shareholders composition. Executive managers were asked what they consider reasons for the changes in their firm and whether they could identify one participat-

ing firm as primarily responsible for the change. As previously concluded, not all foreign joint ventures were equally instable; the joint ventures with Japanese participation proved to be more stable than the joint ventures with American or European participation. It is interesting to examine whether there is a correlation between the stated reasons for instability and the origin of the partner.

6.3.1. Foreign, national or state responsibility

Of all 43 managers included in the firm survey, 27 mentioned a change of shareholders in their firm. According to one third (9) of these 27 managers, the participating foreign firm was the reason for this change: either because the foreign managers or the board of directors of the headquarters were disappointed with the results of the firm (5 cases), or because of changing firm policy which resulted in a withdrawal of the firm from a particular industrial branch (2 cases), or even from Brazil (1 case). Pronor is an example of a firm in which a disappointed foreign company played a role in a changing ownership pattern. This petrochemical company began in 1978 with the participation of the European firm Dynamit Nobel. When the transnational partner decided to leave the firm, Pronor merged with the Camaçari-based petrochemical joint venture, Isiocianaticos. In this firm the foreign company that participated, the American DuPont, also withdrew. According to the managing director of Pronor, both transnationals "did not come to stay in Camaçari, they only came to make money and when this did not succeed in the short run, they withdrew"[6] Another example is Nitrocarbono. A Dutch firm, DSM, participated in this petrochemical company which also started production in 1978. The first four years of its existence the firm only registered large losses. When in 1982 the economic crisis came to a head, DSM no longer believed in the Brazilian market. It sold all its assets to the state company, Copene. Because no improvements were expected in the short run the national partner, Roche Miranda, followed its footsteps and Nitrocarbono became state controlled. After 1984 positive results were once again registered.

Nine managers pointed to either the state or the national private partner as responsible for the change in shareholders or ownership structure. In six firms the national private partner encountered financial problems that forced it to withdraw or diminish its shares. Carbonor is a clear example of a firm in which financial problems resulted in a change of shareholders. The initiative of this firm was taken by two Bahian engineers who had the idea to start a chemical firm for the production of, amongst other things, sodium bicarbonate. With the participation of Norquisa and the Belgium company, Solvay, they started a fine chemical tripartite joint venture in 1979. When capital investments continued to be necessary, they found out that their financial reserves were insufficient. They had no other choice than to withdraw and sell their assets to another national firm, Cabo Branco.

The state companies also sometimes played a role in changing ownership patterns: in one case the shares of the state firm were privatized and, in two other cases, the state firm wanted to increase its control. In Polialden, for example, the national firm,

Banco Economico, took the initiative to start a petrochemical firm together with the Japanese Mitsubishi. They tried to start a bipartite joint venture but were urged to let the state company Petroquisa participate.

Figure 6.3. Reasons for changing ownership structures of Camaçari-based petrochemical firms according to the managers

Reason	number of firms
foreign firm	
tnc disappointed	5
changing policy: tnc withdrawal from sector	2
changing policy: tnc withdrawal from Brazil	1
tnc firm policy	1
national or state firm	
insufficient finances national partner	6
nationalization	2
increase state influence	1
other reasons	
conflicts between the various partners	2
juridical reasons	5
unknown reason	2
total	27

source: firm survey 1989

In two cases, conflicts between the partners were said to be responsible for the changes in ownership structure. An example of this is Polipropileno. In 1979 this firm started as a joint venture between Petroquisa, Cevekol, Suzano and the British ICI. In 1984, ICI sold its assets to the other three partners after extensive negotiations in which no agreement could be reached. Various reasons were stated for their withdrawal. A first explanation was a change in financial priorities of the foreign participant. ICI obtained permission to construct a PET bottle producing factory in Brazil with the restriction that the foreign company could not use its own external capital. The only solution ICI could think of was to sell its assets in Polipropileno and to use the capital obtained from this transaction for the construction of the PET bottle company. Another explanation mentioned was that ICI did not want to participate on a minority basis in a petrochemical joint venture. In the new projected PET bottle company they could obtain a 100% ownership.[7]

Five managers mentioned that the changes in ownership structure were due to juridical constructions or market/resource guarantees.[8] An example is the transformation firm, Sansuy. The petrochemical tripartite company CPC bought part of the shares of this firm in order to safeguard its market.[9]

6.3.2. Differences between American, Japanese and European companies

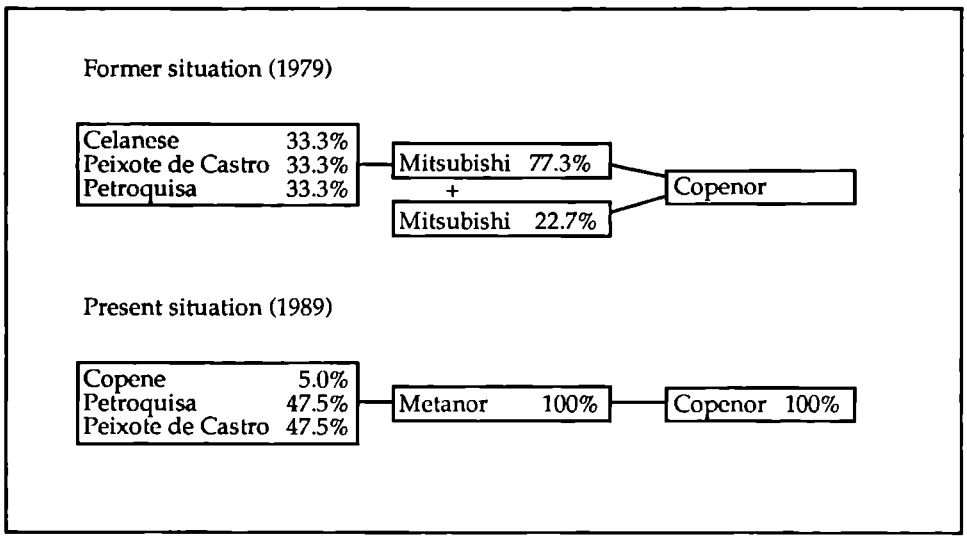
The correlation between the reasons the executive managers gave for the instability of their joint ventures and the country of origin of the foreign companies participating in these firms is interesting. The correlation suggests why the participation rates of the various foreign firms fluctuate and why Japanese partners in the Camaçari complex change less than American and European partners.

In most cases, the managers of American joint venture firms pointed to the foreign firm as responsible for the failure of the joint venture. Several American firms said they were disappointed with the financial results, such as the companies DuPont and Celanese. IFC is another American company which withdrew from Camaçari, selling its shares to the national partner in Oxiteno, grupo Unipar. It is part of the firm strategy of IFC to apply its capital on temporarily basis only. As concerned to the failures of the European joint ventures, the financial limitations of the national partners were more often mentioned as a responsible factor but the changes were also caused by conflicts or disappointed foreign companies. The examples of ICI in Polipropileno and Dynamit Nobel in Isiocianaticos were previously described in this chapter.

The changes in the two tripartite firms in which Japanese companies participated were said to be caused by either a disappointed foreign partner or by conflicts. However, a closer look at the causes for the departure of the Japanese partners shows a similarity between the two cases. In the joint venture Copenor, the national tripartite joint venture, Metanor, and a Japanese company Mitsubishi participated. The Japanese firm apparently encountered severe difficulties with the American partner in co-shareholder of Metanor, Celanese. The conflict escalated to the point that Mitsubishi no longer wanted to participate, not even indirectly, with this American company and decided to leave.[10] (see figure 6.4.) In the second case, the tripartite joint venture Celbras, the same foreign companies played a role. Besides the state partner, BNDES, and the national private firm, Fibase, the Japanese Mitsubishi participated in a tripartite firm named Fisiba, constructed in 1971. In 1987 Fisiba was bought by the same American company, Celanese, which changed the name Fisiba into Celbras, and Mitsubishi decided to leave the joint venture. It is not clear whether Mitsubishi decided to leave before or after negotiations with Celanese had begun. The official reason for the failure of this joint venture and the departure of Mitsubishi was said to be a technological problem, but the similarity with the first case described is remarkable. It is probable that the relationship of the Japanese Mitsubishi with the American Celanese was disturbed to such an extent that the

Japanese company did not want to have any relation with the American petrochemical company.[11]

Figure 6.4. Shareholders composition in Metanor and Pronor in the years 1979 and 1989 in percentages of shares



source: firm survey 1989

In summary, one can say that the participation of foreign firms underwent many changes during the ten years the petrochemical complex was functioning, with the exception of the Japanese firms. Japanese firms that were represented when the petrochemical complex in Camaçari began, are still located on the complex. The participation of European and American firms showed much more fluctuation: many European and American companies invested only temporarily in Camaçari and left when problems were encountered.

6.4. Limitations concerning the transfer of technology

A second important aspect of the functioning of the tripartite model is technology transfer. Can the tripartite model be considered a stimulus for the transfer of technology or was its only contribution the purchase of up-to-date technology at low prices?

The concept 'transfer of technology' is a vague description of a rather complex phenomenon. To clarify this concept it is necessary to distinguish between three different phases of technology transfer. The first phase is the purchase of new technology, either from an external technology supplier or from a participating (foreign) firm. The next phase consists of both absorbing the acquired technology and transforming it to meet the needs of the firm at that moment. When the new technology is absorbed, the debottlenecking can start. This means that all initial difficulties need to be overcome and minor improvements in the technology to adjust it to local circumstances need to be made. When the new technology is absorbed and debottlenecked, the final phase begins, in which further research and innovation can take place. With the newly acquired technology as a starting point, R&D makes it possible to construct another plant with improved production processes or innovated products. It is necessary to keep these characteristics in mind while looking at the technology transfer of the petrochemical firms in Camaçari.

6.4.1. Attention paid by the government to the role of technology

One of the aspects in which the contribution of foreign firms is most evident is the transfer of technology. As has already been discussed in chapters 4 and 5, transnational firms were allowed to participate in the Camaçari complex predominantly because of their supply of technology. The national private enterprises, as well as the state firms, could not construct a petrochemical complex without the contribution of these transnational enterprises. Even the single purchase of technology, without direct foreign participation, was not among the possibilities of that particular period, due to the total lack of experience with petrochemical production on the part of the private national partners. Also, from the point of view of the transnational firms, it was more desirable to participate with their technology in a tripartite joint venture instead of selling their technology. In this way, access to new markets could be obtained.

From the Brazilian point of view, the tripartite model was supposed to be the most appropriate model, not only for obtaining up-to-date technology, but also for stimulating the transfer of this technology. Although stimulation of the transfer of technology was not the main objective of the tripartite model[12], the complementary characteristics of all three partners were thought to influence the transfer of technology in a positive way. In the first place, the technology supplier, by participating in the firm itself, would supposedly feel responsibility for firm results and would, therefore, strive for an optimal application of the new technology. In addition, it would be to the disadvantage of the participating foreign company if firm results were disappointing due to the inappropriate use of technology. Evans puts it as follows:

> "Technology is, of course, one of the multinationals' prime contributions. It would have been possible to purchase most of the technology, but buying technology has its disadvantages. An engineering firm does not have the same

interest in future profits that a partner does. Once a plant is constructed, the engineers are not there to deal with the problems. Getting technology from a partner, whose local profits depend on its efficient operation, is the best way to ensure that it will work."[13]

Secondly, the presence of an unexperienced national partner, eager to learn new technological processes, would be a stimulating factor in the transfer of technology. And finally, the participation of the state was seen as a positive contribution. While most national private partners were almost totally ignorant of petrochemical production processes, the petrochemical state companies were headed by technocrats who had received their training in the technological institutions of Petrobras. Consequently, they possessed up-to-date knowledge of the technological requirements in the petrochemical industry. Furthermore, the executives from the Petrobras staff were better equipped than the national private entrepreneurs to negotiate with the transnational technology suppliers.

Even though the government had already recognized the importance of technology transfer by the seventies, it was not translated into direct policy measures. During the ten years that the petrochemical complex of Camaçari has been functioning, the Brazilian government realized that mere existence of tripartite joint ventures in the petrochemical industry was not sufficient to stimulate national technological development. A much more active government policy was needed. There are two reasons for the increased attention of the government to the role of technology transfer.

Firstly, the very restricted technology contracts proved to be a severe obstacle to technology transfer. In the period that the Camaçari complex was created, the technological knowledge of the majority of the Brazilian entrepreneurs and technicians in regards petrochemical products or processes was negligible. As a result, they were unable to demand more favourable contract conditions in the negotiations over technology. The limits of their technological knowledge is clearly illustrated by the fact that special meetings were organized to teach national entrepreneurs how to read technology contracts.[14] The negotiation of less restrictive contracts, in which the transfer of technology was better arranged, was, however, not the main priority of the Brazilian entrepreneurs at that moment. The utilization of up-to-date technology in their companies was of more importance. Not surprisingly, the technology contracts signed to establish the first petrochemical firms in Camaçari were above all favourable to the transnational companies and did not include many regulations concerning the transfer of the whole package of technology. The last phase of technology transfer in particular, involving expansion of the company with the acquired technology, was almost never arranged in the contracts. Restrictions established in the contracts, include: limits on the maximum production capacity to be realized with the acquired technology; restrictions on export of production or the production process; and limits on further R&D. When the entrepreneurs, and especially the state technocrats, became aware of the impact of these restrictions and realized that national R&D was seriously limited, they began to pay more attention to technology transfer.

The market structure of petrochemical products was a second reason for the increased attention to transfer of technology. As described earlier, in chapter 3, during the economic crisis in Brazil at the end of the seventies, external markets became more attractive to the petrochemical industry. Internal demand dropped drastically and petrochemical firms were forced to search for other markets. This changed market structure, shifting toward exports, had a negative influence on the willingness of foreign firms to sell their up-to-date technology to petrochemical firms. The need for a more independent R&D and to stimulate technology transfer to national firms became evident. Arruda summarizes this as follows:

> "Obliged to export in order to compensate for the loss of the internal market, our firms are confronted with the following problem: their foreign technology suppliers are not willing to continue negotiation over the supply of their technology as before."[15]

The need for a more comprehensive government policy with respect to the transfer of technology, especially in the exporting industrial sectors, is also clearly stated by Coelho:

> "On the level of government policy, one pretends to reward the industrialization process supported by the intensification of the incorporation of process technology. In this way the advanced technology can have a decisive influence on our capacity to compete in international markets".[16]

The increased attention paid by the government to technology transfer resulted only marginally in more direct policy measures. One of the measures was the rule that, before SDI would approve a new petrochemical project, the involved company had to design a R&D programme for which 2% of its annual turnover would be spent.

6.4.2. Different views to technology transfer

Much research has already been done on the role of the tripartite model in the transfer of technology. During the ten years the complex of Camaçari has functioned, several scientists have tried to identify the actual technological development of the Camaçari firms.

A researcher at the Federal University of Salvador in Bahia, (UFBA) Dr. Francisco Teixeira,[17] concluded in 1985 that even though the technology contracts of the Camaçari firms had been less favourable for the national entrepreneurs than at the third petrochemical complex of Triunfo, the transfer of technology could, nonetheless, be called successful. Teixeira bases his research on the assumption that with increase of the volume of Brazilian-used technical equipment the dependence on foreign technology decreases. On the average, 60% of the technological input used in the three petrochemical complexes was met by local supply. For the complex of Camaçari this figure was 70%.[18] More recently, in 1987, Teixeira analyzed the degree to which local petrochemical firms in Camaçari carried out their own Research and Development. His conclusions demonstrated a diminishing dependence on foreign technology. Almost all petrochemical firms in Camaçari increased their production

capacity in the eighties by means of 'debottlenecking'; 85% of all firms carried out control of production quality; and 68,5% of the firms possessed a R&D center. Furthermore, 82% of all firms declared that they were able to make changes in the production process; 76% of the firms could copy the production process with small alterations; and, in 45% of the cases, firms claimed they had developed new production processes on the basis of existing ones.[19]

In addition to Teixeira, several other researchers have also concluded that the tripartite model had positive effects on the technological development of the firms involved. Amilcar da Silva Filho, one of the Petroquisa directors, who was responsible for the technological progress of the petrochemical firms until 1987, reached the same conclusion as Teixeira.[20] Amilcar states that although the basic process technologies still need to be imported, the application of this technology and the operation of the petrochemical firms can be done autonomously. He is concerned, however, about the high degree of dependence on basic technology and know how.

> "Nowadays, if a new petrochemical complex is implemented in our country, we still have to import more or less 80% of the basic process technology".[21]

Francisco Neves da Rocha (1984) made a case study of technological learning in a polypropylene plant in Camaçari.[22] Analyzing the transfer of technology from the British technology supplier ICI to the tripartite joint venture firm Polipropileno, he comes to the following conclusions:

> "The case study provides evidence of a less developed company performing remarkably well according to all usual measurement of technological performance. As it is totally run by its own staff, there is also evidence of an extremely successful learning process. Within the limits of the Brazilian petrochemical industry, it must be made clear that Polipropileno cannot be considered as atypical. Most plants in the Camaçari complex, as an example, perform very well both technologically and commercially".[23]

But despite the high technological level of this polypropylene plant, Neves da Rocha remarks:

> "It has been shown that with the acquisition of the capability to create new techniques, Polipropileno is very far from ICI achievements. (-) ICI, only five years after the purchase of technological information, was already designing an extensively altered and improved process."[24]

A researcher who is less optimistic about the contribution of the tripartite model to the transfer of technology is Valéria Delgado Bastos,[25] who is attached to the Federal University of Rio de Janeiro, (UFRJ). She investigated various technology contracts of the Camaçari based firms and concludes:

> "There is nothing in the technology contracts that verifies the fact that better conditions of technology transfer are provided if the supplier participates as a shareholder in the receiving firm. In several cases just the opposite appeared."[26]

Bastos notices that most of the technology contracts were characterized by restrictions and limitations. The number and content of these limitations varied per firm but in many cases, production capacity with the acquired technology was limited. As a result in most cases, new technology had to be purchased for the construction

of new production entities. Bastos also remarks that in certain contracts restrictions concerning the market of the company were included in order to avoid competition with the technology supplier.

In summary, existing research relating to the contribution of the tripartite model to the stimulation of technological development in Camaçari has been relatively positive. The various authors agree that not all phases of technology transfer were passed through. As a result, national firms were limited in their ability to absorb enough technology to construct petrochemical companies without foreign technology. They also agree, however, that a certain degree of technological development cannot be denied.

6.4.3. Limited technology transfer: results from present research

Most research on technological learning has been based on the analyses of technology contracts or specific case studies. This book will emphasize another aspect: the origin of technology needed for the expansion of the Camaçari firms in order to develop a more comprehensive view of the success or failure of technology transfer and the extent to which R&D took place in the Camaçari based petrochemical firms. It is assumed that technology transfer has been insufficient for a case in which a large number of companies purchase new technology in order to expand their production capacity. The origin of the initial technology, the investment in technology during the operation, and the origin of technology for the expansion of the firms -the three phases of technology transfer- will be described.

The origin of technology used in the establishment of the firm will first be examined.[7] Of all firms included in the firm survey, the seventeen joint venture firms in which a foreign company was currently participating, made use of foreign technology in the establishment of their company. (see figure 6.5.) The same holds true for firms in which a foreign firm had formerly participated: all ten of these firms started production with foreign technology.

The technology of firms which presently have foreign participants, originated more or less equally from American, European and Japanese companies: of the seventeen firms, six obtained technology from an American supplier, four from an European supplier and seven from a Japanese firm. Of the firms with former foreign participation, European firms (in six cases) and American firms (in three cases) supplied the technology. The number of Japanese technology suppliers in this category of firms is small because few Japanese partners decided to leave the joint venture. In most of the cases, the provision of technology was taken care of by the present participating foreign firm. In the five firms in which this was not the case, the technology supplier left the joint venture firm and sold its assets to another foreign firm. For example, in the two US joint ventures, EDN and CELBRAS, the technology was provided by Hoechst and Mitsubishi, respectively. These two firms decided to leave and sold their shares to Dow Chemical and City Bank.

When initial technology is provided, the petrochemical firm has to adapt the technology to local circumstances; first, to debottleneck it and second, to base its further R&D on this technology in order to improve the production process or to use it for the construction of other plants. For this purpose, it is necessary for the petrochemical firms to direct part of their annual turnover to R&D activities.

The firm survey of 1989 showed that R&D activities of the Camaçari-based firms were limited. According to Bastos, but contrary to the figures presented by Teixeira, in 1989, almost half of the Camaçari firms did not invest directly in R&D. Of all firms, only 22% invested 2% of their annual turnover in R&D (which is the official government aim); 30% invested between 0.5% and 1.5%. Also, the number of firms with a R&D center was very limited: only 11 firms claimed to do some research in their own center. This research consisted primarily of trouble shooting or debottlenecking. Only three firms actually possessed a laboratory equipped for more sophisticated research. Most of the firms, fifteen, sub-contracted their research to other R&D centers, mostly centers belonging to the parent company of the foreign partner. Fourteen firms claimed to do no research at all. The disparity between the findings of Bastos and Teixeira can be partly attributed to the location of the R&D center. In this research, a difference is made between 'a company's own R&D center', located on the complex and directly attached to the firm, and 'other R&D centers', located elsewhere and belonging to one of the partners of the firms, in most cases the foreign partner.

In order to measure the success of technology transfer, the origin of technology needed for product expansion and diversification of the respective firms, will be examined.[28] To what extent do the participating foreign firm stimulate or restrict the acquisition of new technology? To answer this question it is first necessary to examine the expansion plans of the Camaçari-based petrochemical firms. Of all seventeen firms which presently have foreign participation, twelve firms said they have plans to expand existing production capacity and ten firms plan to diversify by starting production of one or more totally new products. Only four firms did not have any short-term expansion plans at all, mostly because they had just begun production (see also paragraph 5.3.3.) More or less the same picture can be seen among the firms in which the foreign partner had left the joint venture. Eight out of ten firms were going to expand capacity and of these, five were going to make new products[29] (see figure 6.5.).

With respect to this expansion and the diversification of production, the interesting question is whether the firms need to purchase new technology and, if so, what is the source of this new technology: the parent company of the foreign participant or other foreign firms. One striking feature demonstrated by the figures, is the large number of firms that actually need to buy new technology. Firms with former foreign participation were slightly more in need of new technology than firms with present foreign participation. Of the former category, six out of eight firms with expansion/diversification plans were in need of new technology, for the latter category this figure was nine out of thirteen firms.

Figure 6.5. The origin of technology for respectively the initial plant, the expansion of capacity or/and the diversification of production of petrochemical firms in Camaçari with actual or former foreign participation in 1989

FIRMS WITH ACTUAL FOREIGN PARTICIPATION

name firm	tnc	origin tech	1*	2*	3*	4*
Nitriflex	US	US	no	-	no	-
EDN	US	E	yes	?	yes	?
Celbras	US	J	no	-	yes	US
Silinor	US	US	yes	-	yes	-
Norcomdup	US	US	no	-	no	-
Liquidcarbo	US	US	no	-	no	-
Policarbo	J	J	yes	-	yes	E
Politeno	J	J	yes	US	yes	J
CPC	J	J	yes	-	no	-
Polialden	J	J	yes	J	yes	-
Sansuy	J	J	yes	-	yes	J
Ciquinepet	J	J	yes	J	no	-
Ciquinequi	J	US	yes	J	yes	E
Nitroclor	E	E	no	-	no	-
Carbonor	E	E	yes	-	yes	M
Acrinor	E	US	yes	-	yes	-
Polibrasil	E	E	yes	-	no	-

FIRMS WITH FORMER FOREIGN PARTICIPATION

name firm	former tnc	origin tech	1*	2*	3*	4*
Quimicabahia	US	US	no	-	no	-
Pronor	US	US	yes	-	yes	-
Metanor	US	E	yes	US	yes	E
CQR	US	E	yes	E	yes	-
Oxiteno	US	US	yes	-	yes	B
Etoxilados	E	E	no	-	no	-
Cobafi	E	E	yes	-	no	-
Unirhodia	E	E	yes	E	yes	E
Nitrocarbo	E	E	yes	B	no	-
Copenor	J	J	yes	?	no	-

source: firm survey 1989

1* expansion plans for the increase of production
2* the origin of technology necessary for the expansion of capacity
3* expansion plans for the diversification of production
4* the origin of technology necessary for the diversification of production
E = European firm
US = American firm
J = Japanese firm
M = Mexican firm
B = Brazilian firm
- = no expansion plans or no new technology needed
? = not further identified foreign firm

The number of firms capable of expanding production capacity or diversifying production with their own technology is rather small. In most cases, these firms fall into the category of firms with present foreign participation. Technology came from the parent company but was not sold again as new technology. In Acrinor, for example, Rhodia, a subsidiary of Rhone Poulenc, supplied the technology necessary for both expansion and diversification, while for the firm Silinor, technology came from the parent company, Dow Corning. In only a few cases was the technology further developed by the firm itself. In other words, in these firms the third stage of technology transfer was reached. The firm Pronor, which purchased technology from the two former participants, Dynamit Nobel and DuPont, is an example.[30] The technology Pronor uses is very scarce and difficult to acquire. The need to develop technology within the firm was, therefore, urgent.

6.5. Reasons for limited technology transfer in Camaçari

The research findings point to the limited technological development of the petrochemical firms in Camaçari. Teixeira and Bastos, as mentioned already, attribute the limited transfer of technology to unfavourable technology contracts. Can the unsuccessful technological development of the firms on the complex be explained by this factor only, or are other mechanisms at work as well? In what way does, for example, the tripartite model and the way this model was implemented in Camaçari provide an explanation for the limited R&D? Three factors are of importance for explaining the limited technological development of the petrochemical firms in Camaçari. The first factor that will be discussed is the policy of the Brazilian government; the second factor is the attitude of the national entrepreneurs; and the last factor is the contribution of the transnational enterprise.

6.5.1. Policy of the government: a too fragmented petrochemical sector

Government policy with respect to the use of the tripartite model in the implementation of the Camaçari complex largely influenced the technology transfer. At the time Camaçari was created the first concern of the government was to construct a nationally controlled petrochemical complex which possessed up-to-date technology to support import-substitution. To achieve this objective at the lowest possible costs, preference was given -at least in some projects- to the purchase of cheapest technology. Since less attention was paid to technology contracts, these contracts turned out to be unfavourable for the national partners. The second way in which government policy influenced the transfer of technology was by stimulating the creation of many new petrochemical enterprises. The objective of this policy was to avoid monopolies in the petrochemical sector and to stimulate the creation of a

national petrochemical bourgeoisie.[31] However, the result was not only a fragmented petrochemical sector, but also a large number of small mono-producing companies.

A constraint on the development of R&D activities resulting from this policy is the size of the firm: the annual turnover per firm is too small to direct a large amount of capital to R&D. Of all managers,[32] 30% considered their firms too small to invest in R&D and a further 13% claimed that financial resources were insufficient for R&D activities. Another constraint is due to the mono-producing character of the firms. In a large number of firms production is restricted to one kind of product and, consequently, the firm only possess technology to produce this product. As a result, diversification of production is very difficult, especially in combination with the small size of the firm. Amilcar states it as follows:

> "Besides their small size, in comparison to international standards, the firms are mono-producers, how can they organize a large R&D center for different kinds of research?"[33]

Thirdly, the decision of the Brazilian government to locate the petrochemical complex far away from the center of industrial development in Brazil, in a backward area of the country where there is little industrial activity, presents a serious constraint on further technological development. The region of Bahia has had no experience with technological research, which is evident from the insufficient functioning of the specially created R&D center, CEPED, and the lack of technological infrastructure, such as well equipped universities or well educated technicians and engineers.

6.5.2. Attitude of national petrochemical firms towards R&D

Not only the policy of establishing a large number of new petrochemical firms limited technological development; the decision of the Brazilian government to create a national petrochemical bourgeoisie can also be seen as an obstacle to further technological development of the Camaçari firms. And not only the total inexperience of the new national groups with the technology requirements of the petrochemical industry was a problem. Two other reasons are responsible as well. The first reason was that national private firms were unaware of the importance of technology transfer because they were primarily occupied outside the petrochemical branch. As described in chapter 4.4.2., a number of petrochemical firms originates either from construction companies or from financial banking conglomerates which do not have any core activities in the chemical sector. These companies began to invest in the petrochemical industry, in part because they were requested to do so by the Brazilian technocracy.[34] In addition, investment incentives and cheap loans made investing rather lucrative. Because these firms were not used to chemical R&D, since their main activity was not their chemical enterprise, they preferred to invest their capital and profits in their primary production activities. Or, like the investment director of the construction company Grupo Odebrecht puts it:

"You must never forget that we are not a chemical operating company, we are an investing company, by accident in the chemical sector because that is a lucrative sector, but our main concern will always be the construction sector."[35]

The second reason why the national private partner was not very interested in R&D investments, is the participation of the state partner in the tripartite firms. Given the high level of protection provided by the state technocracy, the national partner does not need to worry about technological progress. Moreover, they produce for the national market and enjoy guaranteed prices. So why innovate?

National private firms investing in Camaçari with roots in the chemical sector does not act in the same way: Oxiteno, for example, a company with headquarters in São Paulo, has its own R&D center and is one of the few national petrochemical firms that is more or less independent of foreign technology.

"Oxiteno is the only national company that executes R&D itself, based on technology from Scientific Design, and has its own technological policy."[36]

6.5.3. The role of transnational corporations

The last factor explaining the limited technological development of the Camaçari-based firms is the role of the foreign firms. One can argue that the behaviour of these foreign firms is one of the main obstacles to further technological development by the petrochemical firms of Camaçari. Foreign firms restrict the technological development of the Camaçari firms in four ways.

First, as mentioned by several authors, the restrictive technology contracts are a serious constraint to further technological development. As previously stated, the Brazilian entrepreneurs were so ignorant of the technology needed for petrochemical production that they were unable to negotiate favourable contracts. The restricted technology contracts resulting from this largely hampered further R&D. Amilcar, one of the Petroquisa directors responsible for the stimulation of R&D in the petrochemical complexes, consideres the restrictive technology contracts a serious disadvantage for future Research and Development:

"It is evident that when restrictions on constructing a new factory with the purchased technology are absolute, it makes no sense to assimilate the technology".[37]

Secondly, the size of the transnationals is an obstacle. A large gap exists between the technological experience of the multinational enterprises and that of the national firms. Multinational petrochemical firms are embedded in a world-wide network of R&D activities. They are constantly supplied with technological knowledge from their own R&D centers which are in most cases located in their home country or in other Western countries. It is difficult for them to see the advantage of carrying out R&D in Third World countries and especially in peripheral regions of the Third World. The most serious limitation on local R&D mentioned by the foreign managers of petrochemical firms in Camaçari are the largely insufficient technological infrastructure of local firms and a scale of research that is far too small to be

effective. That the presence of a foreign participant in a joint venture firm may seriously discourage national R&D is illustrated by the fact that 46% of the managers from Camaçari-based firms said they did not need their own R&D center because all research was carried out in the R&D center of the foreign partner.

Thirdly, the fact that the foreign partner did not always participate with its most sophisticated technology, may hamper further technological development in the petrochemical joint ventures. A petrochemical consultant mentiones:

> "One can say that only transnationals with second rate technology were interested in participating in the tripartite model".[38]

The superior position of transnational companies is due, not the least, to their technological lead. Afraid that loss of control over their technology will diminish international competitiveness, foreign firms are hesitant to contribute their most up-to-date technology to joint venture firms. Consequently, the second rate technology becomes obsolete after a few years, which not only hampers the international competitiveness of the Brazilian petrochemical industry but which may also limit future R&D.[39] Besides their fear of declining international competitiveness, foreign firms were also afraid that nationally controlled joint ventures would sell the technology to other petrochemical companies. Nitrocarbono, for example, sold its technology to a Mexican firm which provided one of the reasons for the Dutch chemical firm, AKZO, not to accept another national partner in its former joint venture firm, Cobafi.[40]

The phenomenon 'technology contamination' underlies the fourth reason for the limited technological development of tripartite joint ventures with foreign participation.[41] The concept 'technology contamination' can be described as "the undesirable mixing of two or more technologies from different origins"[42]. Most multinational conglomerates possess production processes or products which are developed in their own R&D centers. The technologies are registered as their own property, with their patent or trademark. When two companies have developed technologies for the same production process or the same product and are carrying out further Research and Development on this type of technology, they always hesitate to participate in one and the same joint venture, because it is extremely difficult to trace the origin of new inventions. The possibility always exists that a new invention will be claimed by both companies.

But why is this necessarily disadvantageous for technological development within the tripartite model, which includes only joint ventures with one supplier of technology? Apparently the risk of 'technology contamination' is not the issue. Indeed, during the implementation of the tripartite model, no problems of this kind arose since in most cases only one foreign firm supplied the joint venture with technology and in general neither the national nor the state partner possessed any technology at all. The problems began after some years, and in part because the tripartite model was not implemented in an optimal way. On the one hand, the creation of a large number of small scale and mono-producing petrochemical projects and, on the other hand, the instability of the tripartite joint ventures, are responsible for problems of 'technology contamination'. As analyzed above, if the

Camaçari firms want to expand their production capacity or diversify their production, most firms need to buy new technology. In the petrochemical production process technological changes follow one another in rapid succession and, since the Camaçari-based petrochemical firms invested little in R&D, they depend almost completely on foreign technology suppliers. Here the concept 'technology contamination' enters as a reason for the difficult technological development. Participation of foreign firms in the tripartite joint venture can restrict the choice of new technology. If the parent company of the foreign partner possesses the technology needed for expansion or diversification, it will try to convince the petrochemical joint venture to buy their technology, even if it is not the most up-to-date or the cheapest technology. Larger problems will be encountered if the petrochemical joint venture wants to produce a good, but the parent of the foreign partner does not possess the technology. In this case, the petrochemical firms are obliged to search for know how somewhere else. Here again 'technology contamination' limits the possibilities. It can be difficult to find a foreign technology supplier willing to sell its technology to a joint venture in which another transnational -which may be their competitor- is already participating.

The same situation exists in petrochemical firms with former foreign participants. When a former joint venture is nationalized because the foreign technology supplier sold its shares -keeping in mind the instability of tripartite joint ventures, this happens rather frequently- the national firm must depend on other technology suppliers if it wants to expand production or make innovations in the production process.[43] In these cases, 'technology contamination' can also be a problem: sometimes foreign firms are not willing to sell their technology to a national firm which was constructed on the basis of a technology process acquired from another foreign firm. In other cases the foreign firm that withdrew may have objections if the former technology contract has not yet been suspended and they are able to hinder further technology negotiations.

The fear for 'technology contamination' can result in stagnation of technological development at the Camaçari-based petrochemical firms. When no technology supplier can be found who is willing to sell up-to-date technology to the (former) joint venture, the company has to continue production with apparently obsolete technology or it has to depend on second grade technology obtained via illegal means or from obscure origins.

6.6. Technology transfer compared for Japanese, American and European firms

From the above it can be concluded that foreign firms restrict the optimal transfer of technology in the Camaçari-based petrochemical firms in various ways. Based on the idea that these firms cannot be seen as a homogeneous group of enterprises with one similar perspective, it is interesting to consider the extent to which

differences between the foreign subsidiaries in the Camaçari firms are also important for the transfer of technology. In the existing research over the technology transfer of the petrochemical firms in Camaçari, hardly any reference has been made to differences between foreign firms. Only Teixeira observed a difference in behaviour between foreign firms of different nationality. Though he was optimistic about technology transfer in the Camaçari-petrochemical firms, Teixeira argued that these successful figures were reached:

> "(...) Despite the fact that the presence of foreign firms in the tripartite joint ventures was frustrating R&D with their unwillingness to invest in growth of production. The individual strategies of the foreign groups, with the apparent exception of the Japanese firms, does not contribute to the growth (of the petrochemical firms, W.R.)"[44].

6.6.1. The three phases of technology transfer compared

Although Teixeira identifies a difference between firms of Japanese and of other origin, does not did pay further attention to this difference nor does he relate it to the technological development of the Camaçari firms. Based on examples taken from firms in the Camaçari complex, the three phases of technology transfer will be compared in relation to the American, Japanese and European partners in the petrochemical joint ventures. The purchase of the initial technology, the adaptation of this technology and the origin of the technology needed for the expansion of production capacity will be successively examined.

Analyzing the way in which technology was acquired by firms in the complex, differences in the willingness of the foreign company to sell its up-to-date technology can be observed, between Japanese firms on the one hand and American and European firms on the other. Japanese companies were disposed to sell their technology on more favourable conditions at lower prices. An example of this is the tripartite joint venture Polialden, for which the Japanese Mitsubishi provided technology at a relatively cheap price in comparison to American or European companies.

In other cases, the reluctance of American and European transnational firms to sell their up-to-date technology was the decisive factor for buying the technology from a Japanese firm. For example, the technology needed by Celbras and Policarbonatos was already used on a large scale by some European and American firms, but only Mitsubishi and Idemitsu were willing to sell it. The non-Japanese transnationals that entered into negotiations -DuPont and Basf in the case of Celbras and Bayer and General Electric in the case of Policarbonatos- found the conditions with respect to protection of technology unfavourable and refused to participate or sell their technology. In summary, the difference between the willingness of Japanese transnationals to sell or to participate with their up-to-date technology, on the one hand and that of the American and European transnationals on the other, is evident. After construction of the petrochemical firm with the acquired technology, the

technology needs to be adapted and debottlenecked before production can begin. A slightly larger number of managers of joint ventures with European participation claimed to encounter problems in this phase of technology transfer than managers of firms with Japanese and American participation. However, the following examples show that the differences between firms with Japanese, European or American participation are not significant.

CPC, a company with a Japanese partner, is an example of a firm that did not encounter any problem with the adaptation of technology. According to the manager the participating Mitsubishi stimulated a rather smooth process. The firm manager of the tripartite Ciquine Petroquimica also did not complain about the Japanese partner, again Mitsubishi. From these examples one cannot, however, conclude that dealing with Japanese firms in the area of technology transfer is always easy. In Policarbonatos and Polialden the Japanese technology suppliers, Idemitsu and Mitsubishi, respectively, were said to provoke more problems. In both cases the technology contract was said to be restrictive and the managers complained that it was difficult to hold the Japanese firms to their promises to transfer all technological innovations for the duration of the contract.

The picture of American transnationals in petrochemical joint ventures is more or less the same. Some managers did not encounter any problem with the adaptation of technology, such as Oxiteno which acquired its technology from Scientific Design, and Quimica da Bahia to which Virginia Chemy provided technology (in both cases, the American technology suppliers are former participants). In the firm Silinor, however, the transfer of technology was said to be very strenuous because the American multinational Dow Corning refused to transfer all technology. According to the manager of Silinor the absorption of technology into the company was seriously retarded.

With respect to technology transfer in joint ventures with past or present European participation, slightly more problems were mentioned by the firm managers. Among the eight firms in this category, problems with technology transfer were recorded in five. A first example is the former Polipropileno (now Polibrasil) to which the British partner ICI supplied technology. Afraid of losing control, ICI did not want to transfer all of its up-to-date technology.[45] A comparable case is Nitrocarbono in which the Dutch DSM contributed its technology. This Dutch state company did not want to supply technology for expansions and decided to leave the joint venture. Another European joint venture, Cobafi, in which the Dutch fibre chemical firm AKZO has a partner, encountered similar problems but came up with a different solution. The Dutch AKZO desired another payment for the expired technology contract of their Brazilian counterpart. When the national partner decided to sell all its shares to another national firm, AKZO did not agree with this choice and bought all shares from both the national private and the state participant. Another firm in which the European partner, in this case the Italian Liquipar, was said to cause problems with technology transfer, is Nitroclor. Liquipar promised to provide all technology needed for the creation of this fine chemical firm, either from

their own R&D center, or from other technology suppliers. As early as the application phase there were problems with this technology.

The examples above show that the adaptation of technology in the petrochemical joint ventures of Camaçari is a rather difficult process for Japanese, American and European joint ventures alike.

A second way to measure the different attitudes of foreign participants regarding technology transfer is to look at the acquisition of technology for expansions. As is described above, the large number of firms needing to purchase new technology for the expansion or diversification of their enterprises is an indication that the third phase of technology transfer at Camaçari was not very successful. In the figures 6.6. and 6.7., all firms that planned to expand or diversify their production are listed, according to the origin of their newly acquired technology.[46] Some small differences appear if the origin of the new technology and the participating foreign partner in the joint venture are related.

The firms with present Japanese partners received slightly more technological acquisitions from other non-participating firms than joint ventures with European partners. For example, Policarbonatos, a firm in which the Japanese Idemitsu participates, was trying to obtain new technology from an European firm. At the time the firm survey was carried out, Policarbonatos was negotiating with the Dutch DSM which claimed to possess the most appropriate and up-to-date technology in the field. Another example, Ciquine Quimica, in which Mitsubishi is a partner, is diversifying its production in the direction of fine chemicals. This company wanted to produce acid acetyl, the raw material for aspirins. In August 1989 negotiations with BASF reached a final stage. In Politeno, the third case in which technology was purchased from a foreign firm, the initial technology came from Sumitomo but the technology for expansion of production capacity was obtained from DuPont. A fourth example, Polialden, a joint venture including Mitsubishi, tried to obtain approval for their linear polypropylene project. Polialden planned to buy the technology from British Petroleum. In only two Japanese joint ventures was the technology acquired entirely from the parent company of the partner, which in both cases was Mitsubishi.

A comparison of European joint venture firms is difficult because of the small number of expanding firms in this category. In fact only three firms can serve for this comparison. Of these three firms, two obtained their technology from their parent company: in Acrinor from the participating Rhodia and in Polibrasil from the participating Shell. In the third European joint venture -Carbonor- the Belgian Solvay could not provide the new technology: instead it was obtained from a Mexican firm. In this latter example the firm had to purchase technology from Mexico despite the participation of the European Solvay, due to the refusal of the large pharmaceutical transnationals, like Rhone Poulenc, to sell their technology to a joint venture involving an European participation. Thereupon, Carbonor tried to buy Rumanian technology but found it to be too expensive. Finally, an agreement was reached with a national chemical firm in Mexico. According to the technology contract Brazilian technicians were allowed to look around for six months in three

fine chemical enterprises in Mexico, filming the production process and registering every detail they considered to be important. There the cooperation with the Mexicans ended. When problems in the Brazilian project emerged, nobody was able to solve them.[47]

Similar quantitative limitations apply to American joint ventures; again only three of them can be included in the analysis. The technology needed for expansion was provided by the parent company in only one case: Silinor. In this American joint venture, the parent company, Dow Corning, provides technology for expansion and diversification. Comparison of American with European and Japanese joint ventures is further hampered because the other two cases are somewhat a-typical. In the present American joint venture, EDN, the participating Dow Chemical does not provide the technology to expand production. The most important technology parts consist of catalyzing agents, however, components that can be easily purchased on the international market.[48] The manager could not mention yet from which foreign technology supplier EDN planned to buy these components. Celbras, finally, is not a joint venture that is comparable to the other joint ventures. The foreign participant in this firm is not an industrial company but a banking conglomerate; the City Bank. Logically this firm was not able to provide technology of any kind so the technology needed for the diversification of the production of Celbras came from DuPont.

In summary, although conclusions based on such small numbers are questionable, one can state that European and American firms depend slightly more on their parent company for the purchase of technology. Japanese partners in the Camaçari joint ventures seem to depend somewhat more on outside technology suppliers.

With respect to joint ventures with former foreign partners, three firms were able to expand production with technology they developed themselves. An equal number of firms had to buy technology from outside suppliers. No differences between former participating foreign transnationals are evident, however. In the first example, Copenor, a former joint venture with the Japanese Mitsubishi, Japanese technology was not well adapted to the Brazilian environment. The chemical plant that was constructed in Camaçari was an exact copy of a Mitsubishi plant in Japan where limited space was available. Expansion of production proved difficult in the compactly constructed Camaçari plant. Although it was possible in technical and juridical sense to copy the Mitsubishi plant, in economic sense it was not effective. The next example is the joint venture with the former participation of American Morton Norwich. The technology used to construct this company was obtained from the Italian DeNora, and was at the time considered the most appropriate technology. Changing standards of environmental protection and labour conditions were the reasons for purchasing new technology from outside suppliers, in this case a German supplier. The last example is the case of Metanor, a former tripartite joint venture with participation of the American Celanese, constructed with technology from ICI.

Figure 6.6. Origin of newly acquired technology for expansion or diversification of the production of the petrochemical firms of Camaçari with present foreign participation in 1989

FIRMS WITH PRESENT FOREIGN PARTICIPATION

	tnc	origin first technology	origin new technology
EDN	US	Hoechst	unidentified tnc
Silinor	US	Dow Corning	parent company
Celbras	US	Mitsubishi	DuPont
Acrinor	E	Standard Oil	parent company
Polibrasil	E	ICI	parent company
Carbonor	E	Solvay	Mexican
Policarbo	J	Idemitsu	DSM or DuPont
Politeno	J	Sumitomo	DuPont
Polialden	J	Mitsubishi	BP
Sansuy	J	Japanese firm	unidentified tnc
Ciquinpet	J	Mitsubishi	parent company
Ciquinquim	J	Scientific Design	Basf
CPC	J	Mitsubishi	parent company

source: firm survey 1989

Figure 6.7. Origin of newly acquired technology for expansion or diversification of the production of the petrochemical firms of Camaçari with past foreign participation in 1989

FIRMS WITH FORMER FOREIGN PARTICIPATION

	former tnc	origin first technology	origin new technology
100% multinational subsidiaries			
Cobafi	E	Akzo	parent company
Unirhodia	E	Rhodia	parent company
100% national firms			
Pronor	E/US	DuPont, Dynamit Nobel	own technology
Metanor	US	ICI	White Martins, Union Carbide, Rhodia
CQR	US	De Nora (I)	German firm
Nitroca	E	DSM	own technology
Copenor	J	Mitsubishi	external technology
Oxiteno	US	Scientific Design	own technology

source: firm survey 1989

After the departure of Celanese, technology for expansion will be purchased from White Martins/Union Carbide and the technology for diversification from the French Rhône Poulenc. In three of the former foreign/local joint ventures the technology needed for expansion or diversification was provided by the company itself (see figure 6.7.).

6.6.2. Reasons for the more outward orientation of Japanese partners in regard to technology acquisition

With respect to the three phases of technology transfer, differences between American and European transnationals, on the one hand and Japanese transnationals, on the other, can above all be noticed in the first and third phase. Why did Japanese companies accept less favourable conditions of technology transfer and why did joint ventures with European and American participation rely less on external technology than joint ventures with Japanese participation?

The answer to the first question lies in the position of the Japanese petrochemical companies in Brazil. The Japanese transnationals considered the tripartite model an excellent opportunity to enter a market which until that time had been dominated by European and American transnationals. Consequently, they were more willing to participate with their technology.

The explanation for the second phenomenon is also relatively simple: Japanese petrochemical transnationals are less afraid of 'technology contamination' and allow their joint venture subsidiaries to buy technology from other foreign firms simply because they do not posses the needed technology themselves. In contrast, European chemical transnationals have a much longer history in the petrochemical sector and are, consequently, much more experienced with different kind of production processes and technologies. While European and American petrochemical companies began production 60 to 70 years ago, the Japanese petrochemical industry recently developed. It was only after World War II that Japanese enterprises started to invest in the petrochemical industry and to carry out R&D in petrochemical production processes. For example, Mitsui Petrochemical began research on polymerization processes in 1953. Because of this time lag, the standards of Japanese petrochemical technological expertise lag behind those of European and American companies. Haku Izawa remarks in this respect that:

> "(-) Actual research and development efforts by Japanese have not yet reached the level ofadvanced Western nations, as evidenced by the 1977 figures of 21.6 billion yen for technology exports against 26.8 billion yen for technology imports. (-) The Japanese petrochemical industry has developed on the basis of technological licenses from Europe and the United States."[49]

There are consequences of this relative technological backwardness of Japanese firms. When a joint venture with a Japanese partner wants to expand its production capacity or diversify its production, it is less likely that the Japanese parent company will posses the needed technology than a European company in the same position. In other words, the Japanese joint venture has no other choice than to rely on external technology and cannot afford to be afraid of 'technology contamination'.

On the contrary, it are the firms providing technology that are afraid of 'technology contamination'. An example is Politeno. In this tripé the Japanese Sumitomo did not possess the up-to-date technology for the expansion of the production of linear polyethylene. Evidently it was not a viable option to expand production using obsolete technology and thus Sumitomo did not object to the idea of buying

technology from other foreign firms. However, the technology supplier DuPont raised objections and agreed to sell its up-to-date technology only after a secrecy clause was signed by the Japanese headquarters. According to the contract the Japanese technicians and engineers were not allowed to enter the laboratory where the technology is adapted. In another case, Policarbonatos negotiated with both DuPont and DSM for the acquisition of new technology. To protect its own technology, DuPont demanded a contract period of fifteen years.[50] The INPI[51] allows a technology contract with a maximum period of five years, which was the reason that DuPont demanded an extra 'Side Letter'[52] in which the special conditions of the agreement were registered. For this extra 'Side Letter' the permission of the head quarters of the Japanese partner, the participating Idemitsu, was needed. Because Japanese firms are not very enthusiastic about the use of 'Side Letters',[53] the negotiations were retarded and in 1989 a final choice between DuPont and DSM had not yet been made.

While Japanese transnationals were allowed to obtain technology from suppliers other than their parent company because they had no other choice, American firms, in most cases, possessed enough technology to compel their joint venture subsidiaries to buy technology from them. The fear of 'technology contamination' on the part of American companies has much to do with the rather vague Brazilian regulations with respect to technological property rights. Or, as a Dow Chemical executive puts it:

> "Our headquarters in the US are frightened to death of selling up-to-date Dow Chemical technology to other firms in Brazil or even of participating with sophisticated technology in Brazilian joint venture firms. They have the idea that we are throwing ourselves in front of the wolves by doing so".[54]

An example of the cautious attitude of Dow Chemical is their new petrochemical project in the Polosul complex. Although Dow Chemical is negotiating with national private petrochemical companies, they are hesitant to enter with their own sophisticated and tested technology. During the initial one or two years, they will wait-and-see how the joint venture works out and only then decide whether to contribute their own technology.[55] While joint ventures involving American firms were reluctant to buy external technology, they seemed less hesitant to sell technology. In no less than three cases the same American transnational -DuPont- had sold or was planning to sell its technology to a Camaçari-based petrochemical joint venture. The reason is that the company has decided to reduce its activities in the petrochemical commodities branch and will concentrate on other activities. Still the company tries to avoid creating future competition with its own technology.[56]

The chemical conglomerates with the most experience can be found in Europe. These companies can also be considered the most restricted and isolated chemical producers. They were remarkably absent as technology supplying companies or as technology buying companies. Only Ciquine Quimica, a tripé with Japanese participation, purchased technology from an European firm; this was technology for the production of the acrylic acid absorbent polymer which was bought from the German BASF. The German company is a world leader in this kind of technology

and, although the contract contains several restrictions, it will be difficult to avoid some technological leakage to the Japanese partner Mitsubishi. The reasons that BASF accepted this rather risky deal are complicated and predominantly of a commercial nature. The competition on the acrylic acid market in Brazil is very harsh; because of the very high annual rate of return various Brazilian firms are trying to enter this market. The most important competitor of Basf recently signed an agreement with the Brazilian Oxiteno to start production of this fine chemical in the petrochemical complex Polosul. If BASF does not quickly establish relations with a Brazilian-controlled joint venture, the company will lose its right to import this kind of raw materials and, consequently, will lose a considerable share of its market.[57] For Mitsubishi, on the other hand, this deal offers a rather good opportunity to acquire more insight into the fine chemical production process.[58] Other European joint ventures have not been involved in the purchase of technology from other foreign firms. In most cases the European parent company possesses the most up-to-date technology. Also most European companies can acquire technology from their own sources. For this reason, these firms will not allow their joint ventures to purchase technology from other foreign firms if there is a risk of 'technology contamination'.

6.7. Summary and conclusions

In 1989 the petrochemical complex of Camaçari had been operating ten years. This anniversary provides not only an occasion for cheerful festivals and solemn ceremonies, but also for a critical evaluation of the developmental model which had been used in the implementation of the complex, the tripartite model. In this chapter such an evaluation is made, focusing on two factors: the stability of the joint venture structures and the extent of technology transfer.

In 1979 tripartite joint ventures were seen as an optimum solution for the petrochemical industry. Although not every possible partner showed the same enthusiasm -the American firms in particular preferred 100% enterprises- ten tripartite and seven bipartite joint ventures were created in Camaçari. Ten years later, the figures demonstrate that the popularity of tripartite joint ventures had declined sharply. Despite the fact that several new chemical plants had been constructed at Camaçari, thereby increasing the number of plants from 27 to 50, almost no new tripartite joint ventures had been created. On the contrary, several joint ventures changed their ownership structure from a tripartite into a bipartite joint venture or to 100% ownership. Although not all tripés directly changed their ownership structure, most of them did change their shareholder composition. The large difference in the degree of stability provided by different foreign partners, is noteworthy. Japanese participants proved to be far more stable partners in tripartite joint ventures than American or European transnationals.

To discover the reasons why tripartite joint ventures are showing such a large degree of instability, the responsibility for the change in shareholder composition of all three partners was analyzed. The number of managers who blamed the foreign enterprise for the difficulties or failure of the joint venture was equal to the number of managers that blamed the national or state partner. With respect to the foreign company, disappointment with firm results was said to be the most important reason for leaving the joint venture. National firms most often mentioned insufficient financial reserves. Especially the American companies left Camaçari out of disappointment with firm results.

Although the preconditions of the tripartite model were seemingly positive for the transfer of technology, and previous research pointed in the direction of a satisfactory transfer, this present research reached other conclusions. When the three phases of technology transfer are analyzed separately, the Camaçari firms did not demonstrate the expected technological development. Although up-to-date technology was acquired in the implementation phase, little innovative R&D was carried out at the petrochemical firms of Camaçari. Trouble shooting and debottlenecking activities did take place in the laboratories of the complex, however. Most firms transferred their research to other R&D centers, in general those attached to their participating foreign partner. The best indication that not all phases of technology transfer were passed through is the origin of the technology for expansion or diversification of production. Only a few Camaçari companies were able to expand production on the basis of technology they had developed themselves. Most of the companies depended on external technology, either purchased from the participating foreign transnational, or acquired from external suppliers.

With respect to the first phase of technology transfer, the purchase of the initial technology, the Japanese partners were in general more willing to contribute their technology on for them less favourable conditions. American and European companies sometimes refused to participate in a minority joint venture with their up-to-date technology. There is no noticeable difference between foreign participants in the area of R&D and problems during the second phase of technology transfer. If the origin of technology needed for the expansion of production is examined, it appears that Japanese companies depended somewhat more often on external technology while European and American partners were more likely to purchase technology from their parent firms. The relatively weak position of Japanese transnationals in the Brazilian petrochemical industry in comparison to their American and European competitors, provides an explanation for the first phenomenon. Japanese transnationals saw the tripartite model as one of the few ways to enter in the Western-dominated petrochemical market. Japanese companies rely more on external technology because they have only recently became involved in petrochemical production; as a result their technological know how in the area of petrochemical production is less developed than that of American and European petrochemical producers which have invested for several decade in this industrial branch.

It is obvious that the tripartite model did not only exert a positive influence on the development of the Brazilian petrochemical industry. Several limitations such as

the instability of joint venture structures and insufficient technology transfer can be identified. Differences between Japanese transnationals, on one hand, and American and European transnationals on the other, will be further analyzed in the following chapter.

Notes chapter six

1. Because the sectoral dynamism is thought to be of importance as well, all firms located on the petrochemical complex of Camaçari were included in the analyses.
2. The figures mentioned for the successive years do not guarantee a complete view of the change in ownership structure. For instance it is possible that between 1980 and 1985 changes occurred that were not registered by Copec.
3. In Unirhodia the national firm Unipar decided to leave the joint venture even before production actually started. The national partner of the synthetic fibre producer Cobafi was a former family company that was falling apart. The sons of the founder Roche Miranda did not succeed in continuing the successful firm strategy and they decided to sell all their assets in petrochemical firms. The foreign partner Akzo did not want another national private firm to participate and in 1989 Cobafi ended up as a 100% subsidiary.
4. In this table only the number of firms that are projected or cancelled is included and not the number of firms which changed its ownership structure.
5. Of all firms included in the firm survey, 42 managers responded to the question concerning changes in ownership structure.
6. Firm survey managing director Pronor, July 1989, Camaçari.
7. Firm survey, managing director Polibrasil, August 1989, Camaçari.
8. One firm did not know the answer and is registered as a missing case.
9. The mutual dependency of the two firms is large: Sansuy could be considered one of the main clients of CPC; on the other hand CPC was the main supplier of raw materials for Sansuy.
10. Celanese did not stay very much longer in the Metanor joint venture but also decided to leave.
11. Another remarkable aspect in this case is that Celanese did not participate in Metanor for a long period either. When the firm survey was carried out, no foreign firm was participating in either Pronor or Metanor.
12. Suarez, M.A., 1986, p 136.
13. Evans, P., 1979, p 239.
14. Gastão Vitor Casper, Contração de tecnologia para a industria petroquimica; first Brazilian petrochemical Congress; 8-12 november 1976; organized by the IBP (Instituto Brasileiro de Petroleo) in Rio de Janeiro.
15. Ibid, p 5.
16. Coelho, R.R., Quimica-sciencia tecnologia e politica industrial, Revisto de quimico industrial, Jan 1986, 8-15, p 9.
17. In 1985 Francisco Teixeira completed his PhD research for the University of Sussex on technology contracts in the Brazilian petrochemical industry. Besides a PhD thesis, which is titled 'The political economy of technological learning in the Brazilian petrochemical industry', his research resulted in a number of articles including: 'Incorporação de tecnologia na indústria petroquímica' in Revista Brasileira Tecnologica, v 14 (4), July/August 1983, which is one of the most important.
18. Teixeira based his conclusions on an analysis of the technology contracts of 21 firms on the petrochemical complex of Camaçari. 1985, p 284.
19. Francisco Teixeira, Dinamica empresarial e tecnológia das empresas do complexo petroquímico de Camaçari; XV encontro nacional de Economia, Dec 1987, ANPEC anais vol II, pp 580-582, Salvador.
20. Interview Amilcar de Silva Filho, May 1988, Rio de Janeiro.
21. Amilcar de Silva Filho, Petroquímica se esforça para desenvolver uma tecnologia brasileira; in: Petro & química Nov 1985, (35-40) p 35.
22. Franscisco Neves da Rocha, a case study on learning of petrochemical technology, the polypropylene diluent phase process, PhD thesis, Imperial college, UK, 1984.
23. Francisco Neves da Rocha, 1984, p 158.
24. Ibid. p 162.
25. Valéria Delgado Bastos, A questão tecnologica nas joint-ventures petroquimicas brasileiras, Rio de Janeiro, 1989.
26. Valéria Delgado Bastos, 1989, p 275.

27. Because especially the role of foreign firms in providing the initial technology is investigated, in the following analyses only firms with actual or former foreign participation are included.
28. Expansion of production means a mere increase in the production capacity, but when diversification of production is at stake, another kind of product will be produced, sometimes related to the initial product, sometimes a completely different kind of product, like, for example, a fine chemical product.
29. If the total number of firms that designed plans for the future production of new chemical goods is examined, it is obvious that the entrepreneurs want to end mono-production in their firms: fifteen firms planned to start the production of a product other than their original.
30. Pronor is a joint venture that is the compilation of two former companies: Pronor, with the participation of Dynamit Nobel and Isiocianaticos, with the participation of DuPont.
31. Given the limited experience of the national bourgeoisie with petrochemical production, the national entrepreneurs gave preference to small mono-producing projects.
32. The question in the firm survey: "why are no R&D activities executed in your firm?" was only asked to the 30 managers from firms which had no R&D center or laboratory.
33. Amilcar de Silvo Filho, 1985 p 40.
34. These companies said that they so disliked participating in the, for them unknown, petrochemical sector that: "Nem a vontade tinham", which means as much as "they did not even want it".
35. Interview director Odebrecht, August 1989, Salvador.
36. Interview executive manager Dow Chemical, Aratu, September 1989.
37. Amilcar de Silva Filho, 1985, p 38.
38. Interview Petrochemical consultant, September 1989, São Paulo.
39. Interview Paulo Somers, July 1989, São Paulo.
40. Interview director AKZO, June 1989, São Paulo.
41. This reason for stagnated technological development will be more acute in future expansions of the petrochemical firms.
42. Interview director Shell do Brazil, June 1989, São Paulo.
43. The firms in Camaçari prove that the needed technology for these expansions or innovations in general can not be implemented without foreign assistance.
44. Teixeira, 1987, p 581.
45. In the Polipropileno case the manager and interviewed directors emphasized a problem with technology transfer that Francisco Neves da Rocha (1984) only briefly mentioned in his case study research concerning the technological learning in the same firm.
46. Because it is the purpose of this chapter to investigate the extent to which joint venture firms in Camaçari buy their new technology from other foreign enterprises or obtain this technology from their mother company, and for the sake of clarity, one technology acquisition for every firm is included. Some firms acquired their technology from different sources.
47. Firm survey managing director Carbonor, August 1989, Camaçari.
48. It is necessary to make some complementary remarks concerning the question of technology acquisition. The petrochemical industry is a rather complicated industrial branch in this respect. The technological requirements are differentiated to a large extent according to product and production process. Some of these technologies can be obtained freely on the international market and do not have much intrinsic competing value. Other technologies, however, are very scarce and directly possessed by one or two multinational firms. This hampers fair comparison between the different firms involved in regards to the purchase of technological innovations. One must further bear in mind that in this chapter these technological questions are simplified somewhat for the sake of clarity.
49. Haku Izawa, Trend of Japanese petrochemical industry, Chemical Economy & Engineering Review, March 1980, vol 12, no 3 (no 136) p 21.
50. In general, the foreign firm is obliged during the contractual period, to guarantee the complete transfer of technology. After the expiration of the contract the joint venture cannot be restricted anymore to sell this technology to third partners.

51. The INPI, 'Instituto Nacional de Programma Industrial', is the government organization that, among other functions, has to approve all technology contracts that are signed between foreign and national partners.
52. A 'Side Letter' is an additional part of the contract agreed upon by the various partners in the negotiations, which is not officially included in the contract. This implies the INPI does not have any insight into these 'Side Letters' and can not express its objections against it. This kind of agreement, which is not allowed by the Brazilian government, is registered primarily in 'Side Letters'.
53. Interview Petrochemical consultant, September 1989, São Paulo.
54. Interview Dow Chemical executives, September 1989, Aratu.
55. Interview Dow Chemical executives, September 1989, Aratu.
56. Despite the fact that there are no competitive reasons to object to the selling of technology, DuPont is still afraid of 'technology contamination'. Other petrochemical foreign firms are much less willing to sell their newly developed technology. Dow Chemical, for example, invests largely in petrochemical industries and in petrochemical R&D. It does not want to give away its competitive position based on technological dominance. Interview petrochemical consultant, September 1989, São Paulo.
57. The same attitude can be found among other foreign firms, in particularly in the fine chemical branch. This type of 'backward integration' can be considered an (for the Brazilian government) undesirable effect of a policy that is directed to an increase in national production of fine chemical commodities. Several foreign chemical transnationals import their raw materials from their parent companies or subsidiaries located elsewhere. These firms eagerly seek Brazilian joint venture partners in order to avoid a situation in which they would have to buy their input from Brazilian companies which are inexperienced with the fine chemical production process and cannot cope with the quality standards of foreign companies. Examples of these backward integrating companies are, besides BASF, the fine chemical firm, Norcom DuPont, and the former joint venture, UniRhodia. It is evident that these joint ventures can be considered extremely instable: if the foreign company can afford (in a political sense) to buy out its national partner, it will not hesitate to do so.
58. Interview petrochemical consultant, September 1989, São Paulo.

7

THE DIFFERENT ORIGIN OF FOREIGN FIRMS AS AN EXPLANATORY FACTOR

7.1. Introduction

In the previous chapter the limitations of the tripartite model for the development of the petrochemical sector in Brazil were described. It was argued that these limitations can in part be attributed to the role of foreign firms in this tripartite model, which tend to be large experienced multinational companies in comparison the relatively small inexperienced Brazilian firms. An important finding in the previous chapter was, however, that not all patterns at the complex of Camaçari are applicable to all foreign firms. For instance, Japanese firms proved to be much more stable joint venture partners than American and European firms and joint ventures with Japanese partners more often rely on new technology from other foreign firms for expansion. What are the causes of the differences between foreign participants in Camaçari? What role does the origin of a firm play explaining these differences? In order to answer these questions it is necessary to examine macro-economic aspects as well as aspects at the firm level.

The extent to which the country of origin influenced the investment pattern of the various foreign firms in Brazil is a macro-economic aspect. In chapter 7.2. and 7.3. foreign investment processes of Japanese, American and European companies in Brazil will be described. Attention will be paid to the period of foreign investment, as well as the sectoral preference of the foreign firms.

The next three aspects that will be dealt with are firm oriented. Firstly, the attitude of firms from different countries towards participation in joint venture structures will be described in section 7.4. The different motives American, European and Japanese transnationals had for entering a joint venture will be compared. In the next section, 7.5., the firm organization of the various companies involved at Camaçari will be dealt with. With respect to internal firm organization, the functioning of the board of directors and the executive management are important. In addition, the external relationship of the companies with, for example, government institutions, industrial associations and trade unions is a decisive factor in the functioning of the firm organization. Again, a comparison of the various companies involved will be made. The corporate culture of the American, Japanese and European companies, finally, is the central subject of section 7.6. The influence of country of origin on foreign firms' negotiation processes, management practices and adaptation to the Brazilian environment will be analyzed respectively. The final section of this chapter will focus on the influence of foreign firms on the functioning of the tripartite model. The extent to which a correlation between joint venture

instability and the origin of the foreign firm can be explained and the degree to which origin effects technological development are the subjects of section 7.6.

7.2. Foreign investments in Brazil

Before investigating whether the origin of a foreign firms plays a role in the instability of a joint venture, it is necessary to describe briefly the development of foreign investment in Brazil. Not only the quantitative aspects of foreign investments will be considered; the sectoral preferences of various foreign firms, in comparison to national and state firms, will also be described.

7.2.1. Development of foreign investments in Brazil

The first foreign direct investments (FDI) in Brazil were in the beginning of the twentieth century. One of the first firms that invested in the country was the British/Dutch Shell, arriving in Brazil in 1914. The volume of foreign direct investments only began to increase in the mid 50s, during the administrations of Presidents Café Filho (1954-1956) and Kubitschek (1956-1961) (see figure 7.1.). In these periods foreign investments flourished in part because of government policy: both presidents implemented several incentives to attract foreign firms.[1] In addition to a 'developmental' policy, the more specific policy of import substitution contributed to the increase.[2] Due to the relative political and social instability during the administration of President Goulart (1960-1964), the amount of direct foreign investments decreased.[3] The military coup in 1964 drastically changed the political-economic situation in Brazil. After a period of economic stagnation that lasted from 1964 to 1967, the total net flow of direct foreign investments once again increased rapidly. Figure 7.1. shows that during the so-called Brazilian Miracle, the period between 1967 and 1979, and the several years thereafter foreign direct investments were booming.

Several factors explain the attractiveness of Brazil during this period, such as the impressive growth in GNP. In addition the growth of key industrial sectors, which reached over 10%, guaranteed foreign investors satisfactory rates of return. Evans remarks:

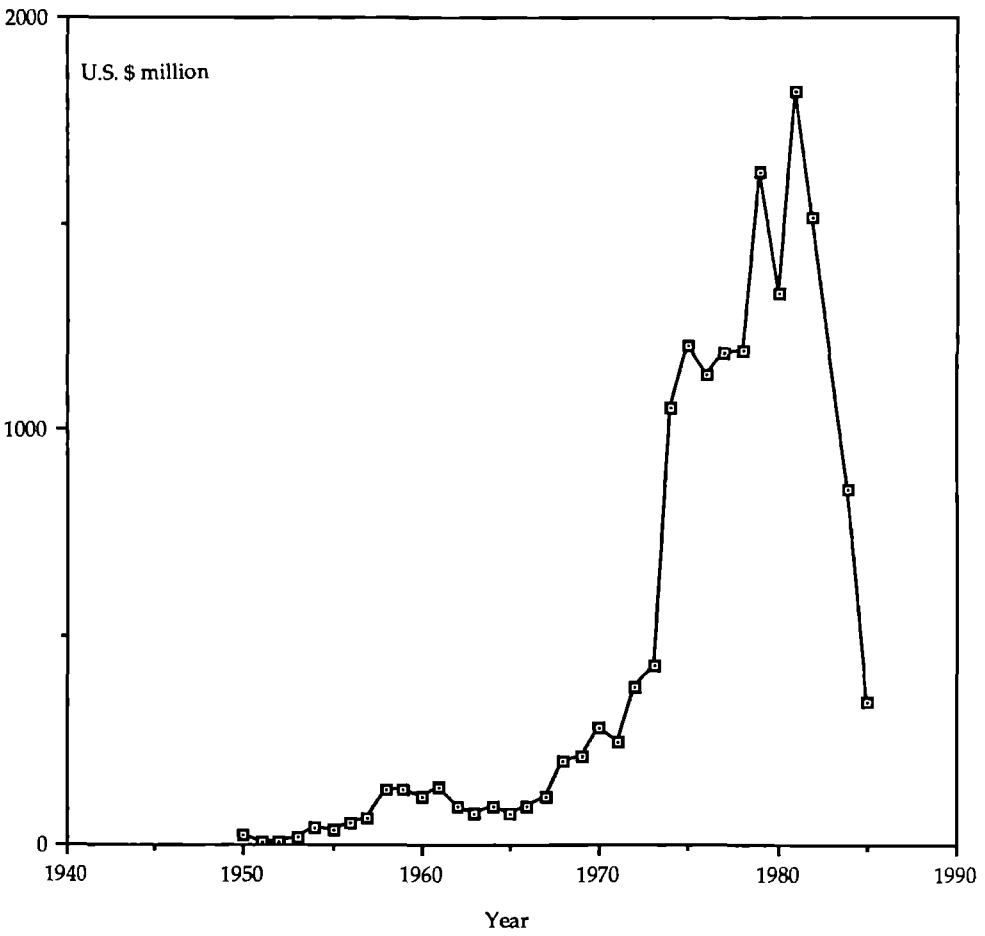
> "Brazil during this period grew more rapidly than any other major Latin American market. Even the European markets which generally grew faster than their Latin American counterparts, did not match the growth in Brazilian consumption".[4]

Secondly government policy during this period was based on a rather open strategy in relation to foreign investments. This can be seen in the pliant attitude of the SDI toward approval of industrial projects from foreign enterprises. In 1971, the SDI

rejected 18 projects out of a total of 773 projects for which foreign enterprises had applied. In 1973 this figure was even more positive: only 35 projects out of a total of 2.888 applied projects were rejected.[5]

The Brazilian Miracle came to an abrupt end after two oil shocks which disturbed the promising economic outlook of the country. Indirectly these oil-shocks influenced the amount of foreign direct investments. Some years after the first oil shock in 1973/1974, the increase in the net flow of FDI stopped. The second oil shock of 1979 had more severe implications and after the economic recession of 1982 a large decrease in foreign investments became apparent.[6]

Figure 7.1. Yearly foreign investments in Brazil between 1950 and 1985 in US$ millions



source: R. Appy, Capital estranjeiro & Brasil, 1987

7.2.2. The various industrial sectors attracting foreign investments

Most direct foreign investments in Brazil focused on the manufacturing sector. In 1971 this figure was 81.8%, only 9.5% of all investments were in the service sector and 5.4% in the public utilities sector. Although these figures changed to some extent, in 1979 the manufacturing sector maintained an absolute dominance: total foreign investments in this sector decreased to 77% and investments in the services sector increased to 17%. (see also table 7.1.). Because this book deals with the petrochemical sector, the analysis will concentrate on the manufacturing sector; the agricultural or service sector will not be included. In chapter 2.3. the remarks of Evans concerning the process of differentiation in which foreign companies invest in some industrial sectors and national companies in others were quoted. Worldwide transnational companies predominate in three catagories of the industrial sector:

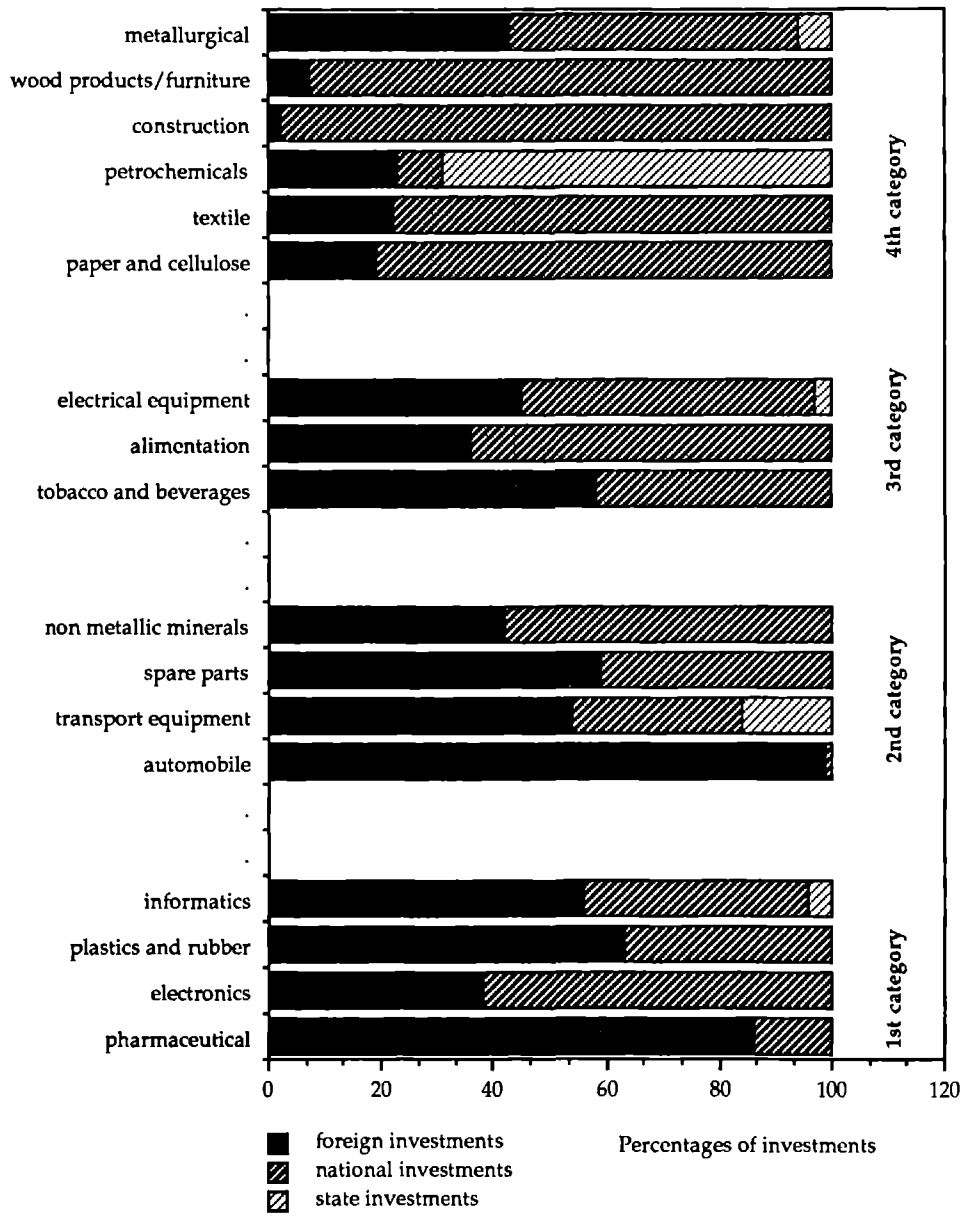
1. technologically more advanced sectors
2. large volume, medium technology consumer goods industries
3. mass production, consumer-goods industries supplying branded products[7]

These three catagories together form the more dynamic industrial sectors, which have large growth potential and relatively high profit rates. National firms are more often found in the more traditional industrial sectors in which the potential for growth in general is smaller and the profit rates are somewhat lower. These sectors comprise a fourth category.

This general pattern is also clearly visible in Brazil. When sectoral investments of national and foreign firms are compared, it appears that in some industrial sectors foreign dominance comes close to 100%. As can be seen in figure 7.2., investments in the first category, the 'technologically advanced industrial sectors', were largely dominated by foreign capital. In the pharmaceutical industry, for example, 86% of total production in 1987 was dominated by foreign companies. In the electronic and engineering plastic sector, foreign representation was 38% and 63% respectively. The same is true for the second category, the 'large volume, medium-technology, consumer goods industry'. The automobile industry in Brazil, in which foreign domination was close to 100%, is representative of this group.[8] The overwhelming presence of foreign companies in the industries belonging to the third category, 'the mass production consumer goods', is evident during a superficial walk through a super market or shopping center. The well-known international brand names of various mass consumer goods do not leave much space for unknown national products. Foreign enterprises were responsible for 45% of the production of electrical equipment, such as electric shavers. The detergent market was dominated by only a few multinational enterprises and some products in the food and beverages sector, such as chocolate and tobacco, were produced primarily by foreign firms.

From the above-mentioned figures it becomes clear that especially the more dynamic industrial sectors are dominated by foreign enterprises, leaving the more traditional sectors, such as paper and cellulose, plastics, wood products and the shoe industry, to nationally owned firms, which suggests that further industrial development is to a large extent determined by foreign companies.[9]

Figure 7.2. Direct foreign investment in the manufacturing industry according to industrial sector in Brazil in 1987 in percentages



source: Exame, edição especial, 1989

7.3. Investment patterns of firms of various origin

In the sixties and seventies Brazil was one of the most attractive Third World countries for foreign investors. As a result transnational firms from all over the world, including American, European and Japanese, opened subsidiaries in Brazil. table 7.1. clearly shows the difference in magnitude of foreign investments originating from Europe, the United States and Japan, over the last 30 years.
European firms were among the first investors to arrive in Brazil at the beginning of the 20th century. Shell, for instance, came to Brazil in 1914 and Unilever in 1929. Nevertheless, the total share of European firms in Brazil's manufacturing firms never reached the magnitude of investments by American firms. As can be seen in figure 7.3. US investments comprised 38% of total foreign investments in 1971, which in absolute figures is 544.0 million US$. Although the economic crisis in the early eighties severely effected American foreign investments, resulting in a diminution of their share from 44% in 1950 to 29% in 1987, they were still the largest foreign investing country in Brazil in 1989. It was not until the sixties that Japanese investors began to arrive and not until the early seventies that their expansion power increased considerably. In 1950 no Japanese company appeared on the list of foreign investors but by 1982 they occupied the third position after the United States and Germany. It is interesting to look in more detail at the uneven pattern of foreign investments by European, American and Japanese investors, paying special attention to their quantity and sectoral preference.

Table 7.3. Foreign investments in Brazil according to country of origin between 1950 and 1987 (in percentages)

	1950	1971	1980	1982	1987
United States	44	38	27	31	29
Germany	-	11	15	15	14
Japan	-	4	13	13	12
Switzerland	-	7	9	9	7
Canada	30	10	3	5	5
United Kingdom	12	9	5	5	4
France	3	4	3	3	3
The Netherlands	?	3	3	4	3
Italy	?	1	3	4	5
others	11	13	18	11	18
total	100	100	100	100	100

source: IBASE*, Banco Central do Brasil 1973, 1981, 1983

7.3.1. Pioneering investments: European countries

European companies entering Brazil focused largely on the primary sector. Agro-business and oil exploration were among the most important activities. The investment pattern of European firms varied according to country of origin. British companies were heavily represented among the early investors in Brazil and concentrated on a few industrial sectors, namely the chemical and pharmaceutical sector, the petroleum and tobacco sector. The largest British representatives in these sectors were ICI, Souza Cruz, Castrol and Atlantis. Although in 1950 the British ranked as the third foreign investor in Brazil, their share declined drastically in the following twenty years. This decline was due to a one-sided interest in investing in Commonwealth countries.[10] By 1976 British investments were ranked six.

While British companies lost the third place they occupied in 1950, German companies succeeded in maintaining the second place. German enterprises arrived relatively late in Brazil: before 1950 their share in total FDI was insignificant. From 1955 onwards investments from Germany increased steadily peaking between 1970 and 1977. Like others, German investments were not left untouched by the economic recessions of 1979 and 1983 after which there is a sharp decline in investments. Further German interests were attracted only after 1984 with the recuperation of the Brazilian economy.[11] With respect to industrial sectors, German firms concentrated above all in the automobile and the chemical/pharmaceutical sector. The two largest companies in the Brazilian automobile branch are the German-controlled Volkswagen and Mercedez-Benz. According to IBASE figures, in 1983 more than 35% of all investments in this industry in Brazil were carried out by German firms. For the transport equipment sector, this figure was 50.1%.[12] Another industrial branch that is favourite among German investors was the chemical/pharmaceutical one. In 1983 the German share in total investments was 12.8% for pharmaceuticals and 8.9% for basic chemicals.[13] The most important German representatives in this sector are BASF, Bayer, Hoechst and Merck. Besides these two important sectors, German investments can also be found in the metallurgical sector -Mannesmann, Krupp- and the textile sector -Adidas, Triumph.

Switzerland, France, the Netherlands and more recently, Italy are other European countries with substantial investments in Brazil. In 1977 the investments of Swiss companies were the third largest after the US and Germany. Although they were surpassed by the Japanese enterprises in 1980, Swiss investments were still the fourth largest in 1987. Swiss firms in Brazil are largely concentrated in the chemical and food sector. Examples include Ciba Geigy which can be found among the largest foreign owners in the pharmaceutical industry, and Nestlé, which is a major representative in the food sector.[14] Dutch enterprises have a long history in Brazil. Entrepreneurs from the Netherlands began to invest in this country at the beginning of the twentieth century. In 1987 nine Dutch companies could be found among the 500 largest enterprises in Brazil. The British/Dutch Shell was the largest company[15] and Gessy Lever, the Brazilian subsidiary of Unilever, was 22nd among the 500 largest Brazilian companies. Of the foreign companies, Dutch firms in Brazil had the

highest expansion figures in 1989.[16] With respect to industrial sectors, most Dutch investments can be found in the chemical, electronic and the alimentation sector. Representatives are, amongst others, AKZO, Shell, Philips and Unilever. Of French investments, those in the chemical sector are most worthy to mention. In 1987 Rhodia, a subsidiary of Rhone Poulenc, was the most important foreign firm in the chemical sector.[17]

Table 7.2. Foreign Direct investments for some sectors and countries in 1979 in percentages

sectors	total	West Germany	United Kingdom	United States	Japan
services	17	7	41	12	20
agricultural	6	3	3	6	6
Chemicals and pharmaceutical	17	10	24	23	3
Vehicles and parts	13	35	1	12	4
Metallurgy	9	15	4	4	16
Mechanics	9	14	4	11	10
Electrical and communication	8	8	2	10	11
other industries	21	8	21	22	30
total	100	100	100	100	100

source: Schliemann, The strategy of British and German investors in Brazil, 1981, Gower

7.3.2. Brazil: backgarden for the United States?

At the end of the eighties, the United States was still the most important foreign investor in Brazil. Although their relative position is about to change. The American investments, which boomed during the Brazilian Miracle, suffered from the two oil-shocks in particular. In that period investments were concentrated in Western countries and not the least in the United States itself. Not only the unstable political and economic situation in Brazil, but also the favourable investment incentives provided in the United States itself, are responsible for this change. The sectoral preferences of American companies are largely comparable to those of German companies. In the first place large American investments can be found in the automobile sector. The largest representative of this sector is Ford. The second important manufacturing sector is the transport equipment sector. The tire industry in Brazil is almost completely dominated by Firestone and Goodyear. IBM and XEROX are examples of American representation in the electronic sector. American

multinationals can also be found in the chemical sector; Dow Chemical is the most important, but DuPont, Johnson & Johnson, White Martins and Liquid Carbonics are also worth to mention.

7.3.3. The Japanese: fast rising newcomers

During successive decades at the beginning of the twentieth century, Japanese relations with Brazil were limited to trade relations only. The so-called Japanese 'sogo shosha' (see chapter 2) imported various products that Japan lacked itself, such as iron ore, bauxite, paper and pulp, cotton and food. During that period Brazil was Japan's third trading partner.[18] Direct investments from Japan began to enter Brazil in the 1950s but were of limited magnitude.[19] In the seventies the political as well as economic relationship between Brazil and Japan intensified which can be illustrated by the official visit of the Japanese royal heirs to the seventieth anniversary of Japanese immigration to Brazil in 1978. Due to the changing internal situation in Japan -rising labour costs, shortages of raw materials- production costs increased after the Second World War and Japan started to look for investment opportunities overseas. Brazil, in need of investments in order to maintain its high growth rates, warmly welcomed the new investors. Moreover, according to Ibase, Brazil wanted to diversify its one-sided dependence on American and European investments:

> "These considerations in Brazil and the realities of the global economy encouraged Brazil to adopt a diversification strategy. They adopted this strategy to reduce dependence on any single country. (-) Amicable relations with Japan were regarded by Latin governments as a desirable counter to American influence."[20]

Bruce points to another reason why Brazil looked to Japan in particular to attract more diversified investments:

> "The factor of ethnic ties between (Japan and Brazil) adds an additional element that is unique among pairs of LDCs and industrial states. Japanese Brazilians number nearly one million and thus can potentially provide a special link to Japan."[21]

As a result, during the Brazilian Miracle Japanese investments in Brazil sharply increased. Despite the fact that Japanese companies arrived relatively late in Brazil, within a few years time they occupied the third position on the list of foreign investors, behind the United States and Germany. In general Japanese entrepreneurs used the so-called 'sogo shosha' as an intermediary for their investments in Brazil. Since Japanese companies were unacquainted with the local situation in Brazil, trading companies played a decisive role in their Brazilian foreign investments. The most important 'sogo shosha' operating in Brazil are C. Itoh, Nissho Iwai and the Mitsubishi Trading company. The position of Japanese investing companies in Brazil remained stable during the eighties, during which about 13% of all foreign investments were of Japanese origin.

Japanese investors tend to concentrate on different industrial sectors than American and European investors. Since the Brazilian automobile industry is largely dominated by a few American and German transnationals this sector is inaccessible to other foreign companies limiting the Japanese share of investments in this sector to only 4%. (see table 7.2.). The industrial sectors in which most Japanese companies can be found are the machinery sector, the transport equipment sector, the petrochemical sector, the textile sector and the electronic sector. One of the first companies that came to Brazil in 1963 was Mitsubishi Heavy Industries which established a joint venture with the Brazilian 'Companhia Brasileira de Caldeiras e Equipamentas Pesadas'.[22] One form of Japanese involvement in the textile sector is represented by Howe Machinery Ltd., a Japanese company created for the production of machinery for the textile industry. The firms Seki and Toboyo invest more directly in textiles. A Japanese company in the transportation sector is Yamaha Motor, a company that entered Brazil in 1970 and started production of motor bikes.[23] Some of the largest Japanese companies can be found in the electronic sector such as Asahi Optical, Canon, Yashica, Brother, Sharp, Sony and Toshiba.[24] Mitsubishi is the most important Japanese representative in the petrochemical industry, followed by Sumitomo and Idemitsu. Although small in comparison to their European and American competitors, Japanese firms can a also be found in the pharmaceutical sector.

7.4. Attitude of foreign firms towards joint ventures

So far, attention has been paid to the macro-economic differences in investment patterns between foreign firms. However, the extent to which the origin of a foreign enterprise influences its behaviour at the micro-level, that is, the level of the firm, is not yet clear. Because the tripartite model consists of joint venture structures, the first aspect of importance in this regard is the attitude of foreign firms towards joint ventures. What, according to the managers, are the advantages of participating in joint ventures and what is the influence of national origin on these attitudes.

7.4.1. Motives of American and European firms for entering into a joint venture

As described in chapter 2.7.2., (motivations to start joint ventures), the relative success of a joint venture depends largely on the rationale for entering a joint venture structure and the advantages firms obtain from participation. An examination of the motives of companies participating in the Camaçari joint ventures will provide insight into the observation that Japanese companies in petrochemical joint ventures tend to be more stable partners than American and European companies.

From the point of view of the national private partner, the motivation for participating in a joint venture is clear. They possessed neither the technology nor the

financial capital to start petrochemical enterprises on their own. The managers of foreign companies, however, were more ambiguous about participating in a joint venture. Especially American and European companies, and to a lesser extent Japanese companies, complained that the joint venture structures were more or less imposed. The majority of the European and American directors could not think of any advantage to participation in petrochemical joint ventures. Firms that agreed with participation did not see other possibilities for entering the petrochemical sector. Generally, government pressure was the main motive for joining national and even state firms in bipartite or tripartite joint ventures.

According to the American and European managers, the disadvantages of participating in a petrochemical joint venture are numerous. The different backgrounds of the national private partner, on the one hand, and the American or European partners, on the other, was one of the main disadvantages. All participating multinationals are subsidiaries of large transnational companies which possess extensive management networks and intensive R&D activities, whereas the local firms are very small, often family owned, with little experience in the chemical branch. The following example from Shell do Brasil gives an illustration of the opinion of transnational managers:

> "Some of the national firms that participate in the petrochemical industry are very inexperienced with the branch. They are from other industrial or financial sectors and they have to start from zero. But these firms are so small that the potential for learning a difficult technological process, like the petrochemical production process, is very limited. We once established a joint venture with a small Brazilian firm from the agro-sector. This firm's beginning was very curious: the Brazilian firm encountered problems with the storage of its agricultural products because no company in Brazil could produce plastic bags of the size they needed. Because of the reserved market the import of plastic bags was also prohibited and thus the firm decided to start its own plastic bag company. To obtain the necessary technological expertise, a joint venture with Shell was created. Recently our company bought out the Brazilian firm, which could not cope with the planned expansions and preferred to focus on agribusiness. When I asked the Brazilian entrepreneur what he learned from the previous years in the joint venture he answered: petrochemicals are good business!"[25]

Another disadvantage mainly mentioned by American directors in tripartite joint ventures was the participation of state companies. The American-based foreign firms preferred to establish 100% subsidiaries or firms without state participation. Despite all the disadvantages mentioned by managers, executives of American and European companies incidently pointed to the possibility of obtaining subsidies and incentives, which they considered to be the only advantage of participating in a joint venture. In Brazil a foreign firm can only obtain subsidies if it agrees to participate in a joint venture with a national firm. Nevertheless, the foreign managers viewed the impact of these subsidies as minimal:

> "The amount of subsidies and cheap loans is so small if you compare it with the amount of total investments it is almost nothing."[26]

However, a financial incentive, which proved to have large impact, is the provision of relative cheap naphtha:

"When you need a lot of naphtha in your production process, you can diminish the production cost substantially compared with the production costs in other countries. For Shell the subsidized naphtha means a considerable extra revenue."[27]

7.4.2. Motives of Japanese firms for entering into a joint venture

In contrast to the American and European companies, the Japanese companies possessed a totally different attitude: most of the Japanese managers were rather positive about their participation in a joint venture structure. Above all, almost all Japanese executives interviewed appreciated state participation in the tripartite joint ventures. The Japanese executives even considered a joint venture with a state partner a more attractive option than a joint venture with a national private partner. One of the Japanese directors of Politeno, in which the 'sogo shosha' C. Itoh participates, remarked:

"C. Itoh has a lot of experience with foreign investments, but many of our foreign ventures ended in failure because of the absence of state participation."[28]

The president director of Mitsubishi saw the state partner as a necessary intermediary between the other two partners in a tripartite joint venture:

"The large differences that exist between large multinational companies and small national firms can be overcome in a tripartite joint venture. The state can act as an intermediary between the two private investors. And Petroquisa is a very well-equipped state company with relatively good managerial experience. When problems arise with the national partner, Petroquisa can solve these problems".[29]

The same opinion was expressed by one of the directors of Sumitomo in regard to the call for privatization of petrochemical joint ventures, which he considered very harmful for the industry. The opinion of the general manager of Idemitsu -which arrived most recently in Brazil- was an exception; Idemitsu did not need Petroquisa as an intermediatory but rather preferred a joint venture with national private companies only. This exceptional opinion is probably due to the fact that Idemitsu invests in the fine chemical branch, as in Policarbonatos, in which Petroquisa does not play an important role.

7.5. Organizational aspects of the Camaçari-based companies

Another aspect at the firm level relating to the influence of origin is firm organization: decision-making structures within the firm and external relations with outside institutions. In chapter 5.5.4. the decision-making structure of the Camaçari-based firms was briefly discussed. In this chapter, the management structure of the firms

will be discussed in more detail. The most important questions are whether the organization of management had implications for the functioning of the tripartite model and to what extent differences between Japanese, American and European participants in Camaçari influence joint venture decision-making structures. After a brief description of the board of directors and their firm management, the external relations of the companies will be described.

7.5.1. Decision-making structures: board of directors and executive management

As already mentioned, every joint venture firm in Camaçari is managed by a board of directors which is responsible for the more important decisions. The composition of the board of directors depends on the ownership structure and nationality: the board of directors of joint venture firms is somewhat more complicated than the board of directors of 100% nationally owned firms. In the latter type, the owner of the firm -in fact the entrepreneur- is generally appointed to be president of the board. In the case of a family firm, the brothers/sisters or sons/daughters of the president from the board along with the general managers or vice general manager. In joint venture firms, representatives of all participating companies are represented on the board, according to a division that is agreed upon by the respective partners. Generally each partner appoints two or three persons to participate in meetings of the board. These representatives are usually the president directors or the vice directors of each partner firm. Board meetings are held regularly -some firms assemble once every two months, others assemble once a month- only when important decision needs to be taken, meetings are held more often. Important decisions include, for example, new investment projects, changes in the assets of partners, changes in the destination of products and the purchase of new technology.

A lower level of decisionmaking occurs with the management team which is in charge of the daily operation of the enterprise. All matters concerning daily production such as maintenance of the machines, human resources, commercial activities, coordination of infrastructure, are dealt with by these executives. In general, the management consists of three to five executives of which the most important is the general manager assisted by a vice general manager. The number and function of the other executives varies per firm. Most firms possess an industrial or technical manager and a financial manager. In addition to these persons some firms appoint a commercial manager, a human resources manager and a plant manager. The most important executives, like the general manager, the financial and the technical manager are representatives of the individual partners; the other managers are generally appointed and considered as employees. Most joint venture firms at Camaçari employ a similar model in constructing a management team: the three to five executives, headed by a general manager represent the respective joint venture partners.

To some extent the specific role of the foreign partners in the board of directors, as well as direct firm management, is restricted. While the functions 'president' and

'vice president' rotate between the various partners, they are never occupied by representatives of the foreign firms. In this way, Brazilian control over firm decisions is increased. With respect to the firm management of joint venture firms, the position of general manager is never filled by a foreign representative but almost exclusively by representatives of the national partner or, in a few cases, the state participant. A similar pattern can be seen for the position of vice general manager and commercial director. In general, the commercial director is a representative of the national partner which can be explained by the fact that most of the petrochemical production is still intended for the internal market of which national participants tend to be more knowledgeable. There are fewer restrictions on the selection of technical directors. Since the foreign enterprises provide most of the technology in the Camaçari firms, in most cases the technical director is a representative of the foreign partner. There are only three exceptions: two in which the technical director is a representative of the national partner and one in which the state partner appointed the representative.[30] These three exceptions involve joint ventures with American or European participation. All joint ventures with a Japanese partner appointed a Japanese technical director.

The influence of national origin on the decision making structure of the Camaçari firms is another interesting issue. Although differences seems to exist between various foreign representatives on the board of directors and the in-firm management, two differences were frequently referred to.[31] Firstly, Japanese directors and executives were replaced more often than American and European directors and secondly, they were considered to be older and more experienced. The first difference is due to the acute shortage of experienced directors and managers in Japan in the eighties. Because of the expansionist behaviour of Japanese companies in this period -not only in Brazil but in many other countries- the large Japanese conglomerates were in urgent need of experienced managers. This shortage of managers is closely related to the fact that Japanese managers in overseas subsidiaries are mostly the senior, more experienced executives. Japanese companies tend to delegate their executives only if they are capable of acting absolutely independent of other executives in the parent company. Given the long and thorough training of employees and the very hierarchical structure of the Japanese companies, this stage is reached only when the executive concerned is somewhat older. The shortage of experienced directors in Japan is not an easy problem to solve: Japanese companies would rather shift a few managers over the globe than to rely on a relatively inexperienced staff.[32] By contrast, American and European companies view the delegation of employees to their foreign subsidiaries as a kind of training. As a result, directors from these countries are in general younger and less experienced than their Japanese competitors.

With respect to the technical directors, the same can be said. Japanese technical managers are also somewhat older than American and European technical managers. Another difference is the number of foreign representatives in the company. While in most firms there is only one representative of the foreign enterprise, the Japanese joint ventures all have more than one. At Politeno, for instance, three Japanese

executives are present. This can in part be explained by the intermediate role played by 'sogo shosha' in the specific investment structure of Japanese companies. The two directors at Politeno are representatives of the Japanese manufacturing firm, Sumitomo and the 'sogo shosha', C. Itoh. The third employee in this firm is a Japanese engineer supporting the technical process of the plant. The president director of Mitsubishi remarked that it was an active policy of Mitsubishi to put two Japanese representatives in every Brazilian joint venture, one director and one employee. The function of these two Japanese persons is to transfer their experience to the firm.[33]

7.5.2. External relations with governmental and private institutions

In a country like Brazil in which bureaucratic regulations are numerous, foreign companies have to maintain good relations with government institutions and private national organizations. The most important institutions with respect to government regulations are the federal agencies SDI, CIP and CACEX. The Camaçari-based firms have to maintain good contacts with the state organization COPEC, which is the coordinating committee of the Camaçari complex. The chemical association ABIQUIM, a private organization, can also be of importance for the smooth running of foreign firms in the chemical industry. Finally, employers unions like SINPER and SINPAQ can facilitate the maintenance of optimal relations between the labour force and the company management.

How do joint ventures maintain contact with these external institutions? Is there a preference for one partner in the joint venture to delegate representatives to certain important meetings? It is also interesting to ask whether there are differences between joint ventures in which Japanese, American and European transnationals participate. In this way it is possible to show the extent to which joint venture management structures are influenced by the participating foreign company.

The very important role played by SDI in the development of the petrochemical industry was already described in chapter 5. A good relationship with this powerful government agency is of utmost importance for petrochemical firms because every new project needs to be approved by the SDI.[34] The fact that 15 out of the 43 firms in Camaçari said they encountered smaller or larger problems when trying to get their project approved, illustrated the importance of maintaining good relations with SDI. The difficulties varied from heavy competition with other firms (50% of the cases) to problems with so-called 'red tape' to difficulties understanding bureaucratic rules of government agencies (20% of the cases). In many cases the final decision of the SDI was not thought to be the most logical one. One entrepreneur said it was impossible to understand these Extra Terrestrial (E.T.) decisions. Because of the delicacy of the SDI decisions, companies must carefully choose representatives to negotiate with this federal government organization. Most of the managers of the joint venture firms who were sent to negotiate with the SDI were representatives of the national partner since it was considered better to maintain relations with the

government by means of national executives. Only two joint ventures, both with European partners, Rhone Poulenc and Shell, sent their expatriate representative to the headquarters of the SDI in Brasilia.[35]

COFIC plays more of a coordinating than a political role. Through COFIC all firms on the complex can negotiate with federal and state governments on issues such as infrastructural services, expansion plans, and environmental protection. Almost all firms are represented in COFIC and only four firms did not participate in committee meetings. More or less the same comments were made about firm relations to COFIC as were made about SDI. Generally speaking, the joint ventures delegated representatives of the national partners belonging to the firm management to committee meetings, again with the exception of two European joint ventures. The only foreign representatives at Cofic meetings were from 100% foreign subsidiaries.[36]

A slightly different picture emerges of private institutions. Of the 43 petrochemical firms located in Camaçari, 34 were members of the chemical association ABIQUIM[37]; all except one of these can be considered active members of the association.[38] Given the location of ABIQUIM in São Paulo, directors who were delegated to the meetings most often came from the board of directors and not from the firm management at the Camaçari plant. In general, these representatives were not attached to the foreign partner of the joint venture but, instead, to the national partner or, sometimes, to the state partner. In only five cases, a foreign representative participated in the meetings of ABIQUIM. Again, European companies were more likely to send an expatriate foreign rather than a national representative to ABIQUIM meetings. Of the five expatriate representatives in ABIQUIM, four were from European firms; this contrasts sharply with the complete absence of Japanese representatives from the Camaçari firms in this association.

In chapter 4.4.3., the internal power structure of ABIQUIM at the national level was extensively described. The difference in influence of the various foreign firms has not yet been dealt with, however. Although only a small number of foreign petrochemical firms participated directly in the board of directors, there are slight differences between American, European and Japanese firms. Between 1987 and 1989 two representatives of foreign origin could be found on the board of directors of ABIQUIM. Somers from Rhodia and Sonder from Hoechst, both of European origin. Furthermore, of the fourteen foreign directors who participated in board meetings, five were European, seven were American, and two were Japanese. Especially European companies, and to a lesser extent American companies, played an important role in the association.[39]

The union SINPER/SINPAQ represents the interests of the firm management of the chemical firms located in Camaçari in negotiations with trade unions. Only one firm is not a member of this employers union and most of the firm managers consider SINPER/SINPAQ a good representative of their interests. The director president of the union is considered to be a powerful person at the petrochemical complex. All member firms delegate a representative to negotiations with trade unions and in most of the joint venture firms this representative is either the national partner, or, in fewer cases, the state partner.

A representative of the foreign firm was sent to union meetings in only nine cases, six of which involved 100% transnational firms. European dominance is clear -six of the nine representatives were delegated from European firms while the remaining three came from American companies. Due to the mixed composition of the union meetings, there are regular clashes of opinion and conflicts of interest between the foreign representatives and national delegates. This can be illustrated by the example of Dow Chemical. During wage negotiations in September 1989, the foreign representative of Dow Chemical[40] caused some commotion when he did not concur with the common agreement that only a relatively small wage increase would be allowed. Worldwide, Dow Chemical applies its own wage policy, involving relatively high wages compared to those offered by local companies, and several other incentives. In part, this policy is used to keep the influence of labour unions at a minimum. The other Camaçari firms did not agree to the wage increase of Dow Chemical, which became a source of potential conflict. The management of Dow Chemical, which as a recent member of the union was participating in negotiations for the first time, was disappointed by the rigid behaviour of the other firms and the threatening conflict. It became evident to the company that it would be difficult to maintain its own strategy within a joint venture structure.

From the above-described management structures and the organization of external relationship it is clear that Japanese management teams, although consisting of more senior and experienced executives, were less involved in external-firm relationships than their American and European competitors.

7.6. Corporate culture of the various foreign participants in Camaçari

For a more in-depth analysis of the impact of firm origin on the functioning of the tripartite model it is necessary to look beyond the organizational structure of the Camaçari-based petrochemical firms and the relations these firms maintain with governmental and private institutions. Since the proposals presented during meetings of external agencies are the outcome of long discussions within the firm, in meetings of the board of directors or of the executive management, the internal corporate culture of the Camaçari-based firms is also of importance. Three factors relating to the corporate culture will be analyzed: differences in negotiation practices; the firm management in the daily operation of the companies; and the adaptation of various firms to Brazilian culture.[41]

7.6.1. A variety in negotiating practices

One way to estimate the impact of foreign-firm origin on overall management is to ask Brazilian directors of participating joint ventures their opinion of foreign participant(s). The majority of the directors pointed to the striking difference in negotiation practice between American and Japanese firms in particular. American companies were considered to be aggressive, rapid and efficient negotiators:

> "When American firms see an investment opportunity they do not hesitate to take it. Few meetings are necessary before a common agreement is reached and the contracts to be signed are never voluminous. American managers are direct and individualistic decision makers. But when the initial contract is signed and the construction of the company begins, the first problems emerge. Every little hinderance can be the cause of conflict and endless discussions are needed before a common agreement is once again reached."[42]

By contrast, Japanese negotiators were said to be very cautious, they think twice before entering into a new investment project. Many negotiation rituals have to be followed and many persons are involved. However, when agreement is reached and a very lengthy contract signed, everything is arranged in the smallest detail. During construction and production, only small problems emerge because possible complications have been anticipated. According to the Brazilian managers, European firms could be found somewhere in between these two extremes. They are considered very bureaucratic and tough negotiators. A distinction was made between northern countries and southern European countries. The latter are said to be much more flexible in their negotiation practices.

There are various reasons for the differences between Japanese firms, on the one hand, and American and European firms, on the other. First, cultural values are important. Japanese society is largely based on rituals and friendship, which is reflected in the behaviour of Japanese managers.[43] Brazilian directors mentioned several times that Japanese executives consider good relations to be of the utmost importance and want to know their partner well before taking any decision. They were said to be very patient and believe there is an appropriate time for every decision. Secondly, Japanese managers were unanimously described as long-term planners, contrasting strongly with American managers, who were considered to be short-term planners. Again European managers were found in between. This description explains the long and thorough negotiations of Japanese firms; it is obviously more time consuming to plan for ten/twenty years than for five years only. Third, having arrived recently, Japanese firms do not feel very comfortable and secure in Latin American countries. They want to analyze all possible risks before actually making investments. American and European firms are much more familiar with Latin America and know exactly the risks they will be confronted with.

7.6.2. Firm management and adaptation to Brazilian culture

Similar differences distinguish the daily management practices of American, European and Japanese firms. The first difference that was mentioned is the extent to which the foreign partner exhibits dominant behaviour towards the national partner. The presence of the Japanese partners in the Camaçari joint ventures was not experienced as very dominant:

> "They do participate in the joint venture and have representatives in the directory, but their behaviour is very modest. Japanese companies are hardly visible in the daily practice of the firm management".

Japanese firms were also seen as much more patient; they were not eager to reach a high annual turnover within a few years only. Furthermore, Japanese managers were said to be reliable: they keep their promises and their decisions were stable.

Despite the general physical absence of American partners in the Camaçari joint ventures, the Brazilian managers were of the opinion that the Americans pressure the company to make as much profit as rapidly as possible. American managers insist on making their presence known in directory meetings. They were not considered to be very patient but their management style is very informal. "You can go to meetings dressed in your T shirt."[44]

Finally, European partners were blamed by the Brazilian managers for behaving in an imperialistic manner.

> "Not imperialistic in relation to profits, like the American companies, but imperialistic in the sense of being imperialistic."

They were said to dominate the firm management to a larger extent than American or Japanese companies and were called rigid, authoritarian, formal, detailed and arrogant. Their firm administration is not very flexible, especially German, British, and to a lesser extent, Dutch executives were considered to be very rigid managers.

To a certain extent, differences can be explained by the length of time that firms of different origin have operated in the country. European firms have invested in Brazil for so many years that they pretend to know everything and do not seem to be very respectful of their less-experienced partners. Japanese firms only recently arrived in Brazil and, consequently, behave more modestly. Their activities were not supported by substantial background of the Brazilian customs. American companies were satisfied if the company is lucrative and were not interested in exerting too much control.

Differences in negotiation practices and firm management influence the degree to which a foreign firm adapts to Brazilian society. Although one would expect that the longer a foreign firm is present in Brazil the more it will have adapted, this does not seem to be quite the case. According to the Brazilian managers, the Japanese firms -although they arrived in Brazil only recently- have more successfully adapted than their American and European colleagues.[45] Brazilian managers and entrepreneurs characterized the Japanese representatives as respectful, open minded and adjusted. American managers were said to be uninterested in Brazilian culture, disrespectful and not eager to learn the Brazilian language properly. According to

the Brazilian managers, the European managers did not have any problems with the language, but, like the Americans, did not know much about Brazilian culture and were not very interested in learning. Of the European countries the Latin countries - France, Italy and Spain- were said to be more adjusted; their culture bears more resemblance to Brazilian culture.

7.6.3. Opinion of foreign managers

Thus far the thoughts and opinions of Brazilian entrepreneurs, managers and technocrats have been presented. Foreign managers, asked about their opinion of differences between Brazilian and foreign firms, painted a remarkably different picture. While Brazilian managers, entrepreneurs and above all technocrats were all very positive about the attitude of Japanese firms, Japanese managers did not cease mentioning the difficulties they encountered in cooperating with Brazilian firms. Without exception, all six interviewed Japanese executives pointed to severe problems.

The largest problem they confronted with Brazilian firms was the totally different style of decisionmaking and firm management. The managers of Sumitomo were astonished that Brazilian entrepreneurs could take decisions individually. In Japan all decisions are the responsibility of several persons. A second problem encountered was the unlimited optimism of the Brazilians, the lack of risk management and the short-term planning. The mentality of "today we go, tomorrow we'll see!" was not appreciated by Japanese managers. Thirdly, in regard to corporate culture, respondents noticed significant differences. The Japanese corporate culture is much more based in group responsibility, while the Brazilian companies have a more individualistic orientation. In Japanese firms groups of employees are responsible for the overall result of a particular part of the production process. In Brazil everyone shifts responsibility to other employees. Employees only possess knowledge of a particular piece of work and will not do anything else. "Do not ask your secretary to make a photo copy; she will refer you to the copy employee!" Fourthly, the language barrier was a significant problem for Japanese managers. It was considered almost impossible for Japanese persons to be sufficiently fluent in the Portuguese language to understand and express subtle differences. The president director of the Tokyo Bank illustrated this by saying:

> "Portugues e como o ouro Brasileira, adore mais não domine". (Portuguese is like the Brazilian gold: I adore it but I am not able to get grip on it).[46]

Company meetings with many Brazilian participants were said to be particularly difficult:

> "When all Brazilian managers keep talking at the same time, it is impossible to understand one single word of the meeting, let alone exert influence on important decisions."[47]

Finally, Japanese managers considered it a problem that Brazilian managers, in contrast to Japanese managers, are not very impressed by authorities. According to

some Japanese managers, if Brazilian managers can find a way to avoid regulations that they perceive to be restrictive, they will not hesitate to do so. An example of this difference relates to the use of 'Side Letters'. As previously illustrated in chapter 6.6.2. with the example of Politeno, Japanese managers do not easily agree with the use of 'Side Letters'.

The response of American and European directors to questions about differences between foreign firms and Brazilian companies was remarkably different. Most American and European managers did not begin with a laundry list of all difficulties they encountered in cooperating with Brazilian managers. They did, however, say that they would prefer to fully own a company instead of participating in joint venture firms. Less emphasis was placed on problems with Brazilians and more on the concern that they are more or less obliged to participate in joint ventures. Not much difference could be discerned between European and American companies in this regard. It was commonly agreed that it was difficult to participate in a joint venture firm with a small family firm, which had little or no experience in the chemical sector. Differences in decisionmaking processes in particular were said to cause some problems. Small family owned firms could more easily make important decisions than large multinational corporations which depend on their parent companies. The different mentality of the Brazilians, which some managers described as backward, was also seen as a problem. Often the national firms did not want or were not in a position to contribute to innovation, new investment projects or new technology. The difference in flexibility on the part of national firms sometimes frustrated the foreign managers and hindered smooth cooperation.

7.7. Limitations of the tripartite model explained

In previous paragraphs, the role of macro-economic and micro-level factors in the limited functioning of the tripartite models was analyzed. First, the difference between European, American and Japanese investments in Brazil with respect to investment patterns was demonstrated. Secondly, differences in attitude towards joint ventures, firm management and corporate culture were analyzed. One question remains unanswered. To what extent do differences of origin explain the limitations of the tripartite model as analyzed in chapter 6: the unstable ownership structures of American and European partners in particular and the limited technology transfer.

7.7.1. Unstable ownership structures in relation to country of origin

To what extent can the relative instability of American and European joint ventures be explained by the different expansion patterns and management structures of foreign firms in Brazil? Firstly, the recent arrival of Japanese companies in Brazil influenced their attitude about participation in petrochemical joint ventures. Participation in the tripartite model was the only way for those companies to enter an European- and American- dominated sector. Consequently, they had a much more positive attitude about joint ventures which contributed to greater stability.

Secondly, substantial state involvement in tripartite joint ventures is not considered to be negative by Japanese companies; in part because Japanese companies are used to a high level of government intervention in private production activities, and in part because, given their more recent arrival, participation by the state could only improve their position vis à vis foreign competitors and national companies.

A third explanation for the greater stability of Japanese joint ventures can be found in the limited investment possibilities these companies had in other chemical firms in Brazil. Given their more lengthy history in Brazil, American and European foreign investors are represented in several chemical, pharmaceutical and petrochemical companies whereas Japanese representation in these branches is much more limited. If an American or European multinational wishes to sell its assets in a tripartite company, there are several alternative options for further Brazilian investment. Japanese petrochemical companies have few choices if they withdraw from a tripartite joint venture. Given limited possibilities to repatriate capital, Japanese companies will rather try to solve conflicts or problems than sell their assets.

Fourthly, the world-wide tendency of transnational companies to shift their emphasis to the fine chemical sector is an explanation for the greater instability of American and European companies. Japanese companies are less experienced in fine chemicals. In Brazil this sector is dominated by American and European firms limiting the opportunities to swap assets in the petrochemical branch for assets in the fine chemical branch for Japanese firms.

The influence of micro-level characteristics on the greater stability of Japanese joint ventures also needs to be analyzed. Firstly, to what extent does composition of the management and board of directors influence stability? The frequent replacement of Japanese executives, due to shortage of Japanese executives in other subsidiaries abroad, does not contribute to larger control by the foreign partner, but can have a positive effect on joint venture stability. Decisionmaking in tripartite joint ventures is difficult because of the three different management styles imposed on these companies and the presence of three different leaders.[48] This likelihood of conflict diminishes, however, if the presence of one of these leaders is less dominant because, having recently arrived, he is not fluent in Portuguese. Another possible explanation for the greater stability of Japanese joint ventures is that Japanese executives are primarily senior, more experienced employees. These managers are not sent to overseas subsidiaries to gain experience, as one of the first steps in their

career, like European and American managers, but because they have already proven themselves and are in a more advanced stage of their career. This experiential difference has consequences for their behaviour towards Brazilian counterparts.

Differences in negotiation practices can serve as an explanatory factor for the more stable ownership structures of Japanese joint ventures as well. The longer and more thorough negotiations between the partners in a Japanese company diminishes the chance that unexpected problems will arise and, consequently, the possibility of conflicts. The low visibility of Japanese partners in joint venture management also explains the more enduring relationships of Japanese joint ventures. The lack of pretentious behaviour is apparently valued positively by Brazilian managers and entrepreneurs. The more dominant behaviour of European executives in particular is not conducive to a long-standing relationship between the various partners of a joint venture. It is remarkable, however, that despite the greater resemblance between European, and even American, culture and that of Brazil, Brazilian managers nonetheless stated that Japanese executives had more successfully adapted to Brazilian culture.

7.7.2. Limited R&D related to country of origin

In chapter 6.4., the limited technological development of the Camaçari firms was described. With respect to differences between European, American and Japanese participants, two aspects were important: the greater willingness of Japanese companies to participate with their up-to-date technology, and the fact that joint ventures with Japanese participation more often relied on external technology for firm expansions. To what extent can these features be explained by different expansion patterns and management structures? The first phenomenon has already been explained in chapter 6.6.2. The only way for Japanese transnationals to enter the petrochemical branch in Brazil was through participation in a tripartite joint venture. Their bargaining position relative to American and European companies was, therefore, less favourable.

Japanese companies more often rely on external technology suppliers because they lack the experience of their American and European competitors in petrochemical production processes. When the parent company of a Japanese participant in a petrochemical joint venture cannot provide the technology needed for the expansion or diversification of production, the joint venture has to rely on technology purchased from another foreign company. The Japanese multinational, of course, sees this as an excellent opportunity to obtain more up-to-date and diversified technology on petrochemical processes. A correlation of the relationship between limited technological development and the different management structures of the foreign participants does not give remarkable findings. The lower degree of conflict in joint ventures with Japanese participation and the more stable ownership structure had a positive impact on national technological development. The greater joint venture stability contributes to an increase in confidence on the part of the participating

foreign firm. If a foreign participant believes that a joint venture will endure, it will be less reluctant to participate with up-to-date technology. In addition, greater stability makes it possible to avoid a situation in which a disintegrated joint venture becomes a 100% national petrochemical firm, constructed with the technology of a former foreign participant and is confronted with stagnating technological development because no foreign firms are willing to sell it technology.

7.8. Summary and conclusions

In this chapter the role of the cultural characteristics of American, Japanese and European transnationals in the functioning of the tripartite model has been explained. The macro-economic aspects of foreign investments in Brazil from different countries were first analyzed. Different investment patterns of the various countries represented in the Brazilian manufacturing industry can be discerned. Firstly, each foreign partner had been present in Brazil for a different length of time. Japanese firms arrived much later than American and European companies. Secondly, the development of the foreign direct investments followed a different pattern. The American investments show a downward trend during past decades, Japanese investments demonstrate more expansionist behaviour. The European firms can be found somewhere in between. Thirdly, the various companies had different reasons for investing in Brazil. Japanese investments in Brazil were determined by macro-economic factors relating to their own economy whereas the global expansion of American firms can be explained by a micro-oriented, historical interpretation of firm growth. Finally, the foreign firms invested in different industrial sectors. American and European firms were more involved in the dynamic industrial sectors, like the pharmaceutical and the automobile sector, Japanese investments concentrated on the more traditional textile and heavy machinery sectors.

In addition, differences between foreign investors in Camaçari were examined on the firm level. Three aspects were identified as important: the attitude of foreign firms with respect to participation in joint ventures, firm organization, and corporate culture. American and European companies on the one hand and Japanese companies, on the other, had different views about participating in joint ventures. The Japanese partners in Camaçari were much more positive about joint ventures than their American and European colleagues. They saw the petrochemical joint ventures as an optimal structure for entering a Western-dominated industrial sector. Furthermore, state participation, from the Japanese perspective made it easier to survive harsh competition with other foreign participants and was a stabilizing factor between the participants inside the joint venture. By contrast, American and European foreign firms participated in petrochemical joint ventures for political reasons. They saw little advantage to this firm structure and preferred 100%

ownership. According to most Western managers, differences between petrochemical transnationals and national Brazilian companies frequently result in conflicts.

Differences in firm organization between American, European and Japanese participants in the Camaçari joint ventures can also be discerned. In the first place, Japanese partners tend to appoint more executives to their joint ventures. This is in part the result of explicit Japanese company policy. In addition, most Japanese participants at Camaçari combine a manufacturing company and a trading company. Secondly, Japanese executives tend to be somewhat older and more experienced than American and European colleagues, again as a result of the Japanese policy of delegating executives abroad at a final stage in their career. Western executives, on the other hand, are sent to overseas subsidiaries earlier in their career. Given the shortage of experienced Japanese executives, due to this policy, Japanese managers are more frequently replaced. Although there are quantitatively more Japanese managers present in the Camaçari companies, they participate less frequently in negotiations with external agencies such as government institutions, trade unions and coordinating bodies.

Corporate culture is a final micro-level aspect that sheds light on the differences between foreign firms. Every foreign participant at the Camaçari petrochemical companies has its own specific corporate culture which influences its behaviour in the joint venture structure to a large extend. First, there are different approaches to negotiations. In Japanese companies negotiations tend to be extended and detailed, few difficulties are encountered after a final agreement has been reached. Negotiations with American companies are more quickly completed, but more problems can be expected in the aftermath of the final agreement. According to the Brazilian managers, the Japanese exert less direct influence on firm management than the European partners in particular. The latter are said to dominate overall firm management and to be less successful at adapting to Brazilian culture.

It is remarkable that the opinion of foreign managers does not necessarily correspond with the opinion of Brazilian managers. Whereas the Brazilians were only positive about their cooperation with Japanese companies, the Japanese managers encountered many problems. Decisions-making processes were said to be hampered by large differences between Japanese and Brazilian companies: the lack of risk management on the part of nationals, the individualistic behaviour of Brazilian employees and the language barrier were all problems identified by Japanese partners. European and American managers did not spend much time discussing the quality of cooperation with Brazilian companies; they all preferred 100% ownership structures.

It is clear that differences between American, European and Japanese participants in Camaçari have a decisive influence on the functioning of the tripartite model in this petrochemical complex. The greater stability of joint venture structures with Japanese participation can be explained by the more recent arrival of these petrochemical companies in Brazil, the more positive attitude towards participation in joint ventures, especially with state partners, and internal firm characteristics, such as

extended negotiations, long-term-planning, and the less dominating approach to firm management by Japanese companies. The lesser stability of joint ventures with American and European participants can be explained by their longer history in the Brazilian manufacturing industry, which is one of the reasons that they prefer 100% ownership structures. The sense of being compelled to participate in petrochemical joint ventures contributed to the lower level of stability of these joint ventures. The European participants play a more dominant role in direct firm management which is often a source of conflict.

The impact on technological development of the Camaçari firms can also be partly explained by different origin of the various participating foreign firms. Japanese transnationals were willing to participate with up-to-date technology on more favourable conditions than American and European companies because it was their only chance to enter the petrochemical sector in Brazil. Because they have more recently become involved in petrochemical production, they more often have to rely on external technology for expansion. The greater stability of Japanese joint ventures, however, contribute to a higher degree of confidence on the part of the parent company or external technology suppliers and, consequently, to easier access to technology.

The research findings, based on the opinions of managers, entrepreneurs and technocrats involved in the petrochemical industry in Brazil have thus far been analyzed. In the final chapter of this book the findings of this empirical research into the Brazilian petrochemical industry will be examined in relation to assumptions found in internationalization theories.

Notes chapter seven

1. The administration of, for instance, President Getulio Vargas, was dominated by nationalistic sentiments which resulted in various restrictions on foreign investments. When Café Filho became president some of these restrictions were lifted. The most important measure was taken in 1955 when it was declared that foreign companies could register their capital in the Central Bank and repatriate capital and profits. In: Schliemann, P., Les investissements étrangers directs au Brésil, in: Problèmes d'Amerique Latine, 10, Mars 1980, p 38.
2. Pochet, P. Les investissements étrangers au Brésil, 1960-1984, Centre d'Etude d'Amerique Latine, cahier no 6, 1986, Bruxelles.
3. L.C.B. Pereira, Desenvolvimento e crise no Brasil 1930-1983, Editora Brasilense, São Paulo 1968, p 119.
4. Evans, P. Dependent development, the alliance of multinational, state and local capital in Brazil, Princeton University Press, Princeton, 1979, p 167.
5. Pochet, P. 1986, p 2.
6. Ibid., p 3.
7. Dicken, P. Global Shift, 1986, p 65.
8. Schliemann, P., 1980, p 32.
9. The significant influence of foreign firms on the industrial development of Brazil annoyed the national-oriented Brazilian technocrats. This is one reason, among others, that the Brazilian government in the seventies tried to change this pattern, starting with the petrochemical industry. According to the technocrats total foreign domination of the strategic petrochemical sector with its dynamic characteristics must be avoided. Another illustration of this nationally oriented government policy is the micro computer sector. In the eighties production by national companies predominated in this sector due to the many government restrictions imposed on foreign enterprises.
10. Of all British capital (with the exception of petroleum industry, insurance and banks) in 1974 only 4% was invested in Latin America and Central America in contrast with 35% in 1930, P. Schliemann, 1980, p 45.
11. IBASE O Capital Alemão no Brasil, 1984, Rio de Janeiro, p 7.
12. Ibid.
13. Ibid.
14. IBASE, O Brasil e o capital Holandes, Rio de Janeiro, 1987, p 2.
15. Exame, Edição Especial, 1987, Rio de Janeiro, p 34.
16. Exame, Edição Especial 1989, Rio de Janeiro, p 91.
17. There are six criteria -growth, rentability, productivity, liquidity, capitalization and annual turnover- used by the monthly magazine Exame to calculate the importance of every industrial company of significance. Exame, edição especial, Rio de Janeiro, 1989, p 303.
18. Bruce, D., Brazil plays the Japan card, in: Third World Quarterly, 5 (4), 1983, p 851.
19. Ibase, O capital Japones no Brasil, 1984.
20. Ibid.
21. Bruce, D., 1983, p 853.
22. Empresas Japonesas aplicam mais capital no Brasil, in: Tendencia, august 1974, no 11, p 66.
23. Ibid.
24. Ibase, O capital Japones no Brasil, Rio de Janeiro 1984, p 6.
25. Interview director Shell, April 1988, São Paulo.
26. Interview Director President Rhodia and Ciba Geigy, June 1989, São Paulo.
27. Interview director Shell, June 1989, São Paulo.
28. Firm survey Politeno, August 1989, Camaçari.
29. Interview Director President of Mitsubishi, June 1989, Rio de Janeiro.
30. As part of the policy of increasing national control over industrial development, the Brazilian government stimulated the replacement of foreign technical managers by Brazilian technical managers at the end of the 1980s. Most of the foreign executives did not consider this a very good policy. They were afraid the Brazilian technicians had neither the knowledge nor the experience to give good technical support to petrochemical production. Another reason for opposing this government policy was it would prohibit the representation of the parent company by a foreign manager in the

joint ventures firm. Most foreign directors -and in this respect there was no noticeable difference between American, European and Japanese companies- did not like the idea of participating in a firm that was not under their control. In 1988, when Cobafi, a tripartite joint venture firm with the participation of the Dutch chemical enterprise AKZO, was pressed to appoint a Brazilian engineer as its technical director, they appointed a Dutch director to another function with instructions to keep an eye on the technical performance of the firm and for the purpose of not loosing control over the plant.

31. Interviews petrochemical consultant, August 1989, São Paulo and Director President Mitsubishi, June 1989, Rio de Janeiro.
32. Interview director Idemitsu, August 1989, São Paulo.
33. Interview Director President Mitsubishi, June 1989, Rio de Janeiro.
34. The SDI will first investigate the feasibility of establishing a project, including the need for feedstock, the local and external demand, the availability of technology. After this project appraisal the SDI will compare this project to projects submitted by other companies.
35. With respect to 100% foreign owned firms another pattern could be seen; all eight 100% multinational subsidiaries delegated an expatriate manager to the SDI negotiations.
36. It is remarkable that even the 100% transnational firms show a tendency to delegate a Brazilian director instead of the expatriate director. This must be considered a tactical move, a creation of political goodwill.
37. The firms that are not affiliated with ABIQUIM are non- petrochemical firms like the fine chemical firms that are in general affiliated with the association ABIFINA, which has 8 members in Camaçari, and the transformation firms that cannot become member of ABIQUIM.
38. Companies that could be considered active members of ABIQUIM, delegated a representative to the board of directors.
39. ABIQUIM Annuario da industria quimica Brasileira 1987, São Paulo.
40. Dow Chemical only recently started to participate in the tripartite joint venture Deten.
41. In the firm survey as well as in interviews open questions were asked regarding any differences between European, American and Japanese firms. When an affirmative answer was given, the next questions inquired about the character of these differences. The data described in this paragraph is compiled from the answers obtained from firm executives and directors.
42. This remark was made by several different managers of Camaçari-based companies.
43. Rowland, D., Japanese Business etiquette, Warner Books inc., New York, 1985, p 25.
44. Interview, director Cevekol, June 1989, São Paulo.
45. It Is important to bear in mind that this paragraph is based on the opinion of the Brazilian managers only. The way they see 'adaptation' is, therefore, decisive for the analysis.
46. Interview president director Tokyo Bank, June 1989, São Paulo.
47. Interview director Sumitomo, August 1989, Camaçari.
48. Interview petrochemical consultant, September 1989, São Paulo.

8

FINAL CONCLUSION: THE IMPACT OF FIRM ORIGIN ON THE FUNCTIONING OF THE TRIPARTITE MODEL

8.1. Review of Brazil's petrochemical industry

8.1.1. Introduction

The role of multinational enterprises in the process of industrial development in Third World countries has been thoroughly researched by, amongst others, researchers adhering to different streams of the dependency school. Evans' research in Brazil, in particular, provides a valuable contribution to a better understanding of the role of foreign firms in industrial growth in the Third World. Starting from the theory of dependent development, Evans states that economic development in Third World countries can be generated by a constellation in which state capital, national private capital and foreign capital play a complementary role. This so-called concept of the triple alliance is an important factor in the industrial development of Brazil since, as result of the association between local and foreign capital, national capital accumulation is stimulated. Although peripheral industrialization is of a disarticulated nature and dependency on the center still continues, stagnation in the industrial sector is replaced by dependent development.

Evans uses the petrochemical industry in Brazil to evaluate the concept of the triple alliance. In the seventies the Brazilian government drew on the three types of capital -national private capital, multinational capital and state capital- in the chemical sector, to stimulate the development of national petrochemical industry. As a result, a large number of enterprises in Brazil's three petrochemical complexes consists of joint ventures with three partners: the so-called tripartite joint ventures.

8.1.2. Development of the petrochemical industry

In 1979 Evans evaluated the concept of the triple alliance as it is implemented in the most important petrochemical complex, the Camaçari complex, which at that moment was in its initial phase. In the research presented here, the same petrochemical complex is chosen in order to evaluate Evans' theoretical assumptions about triple alliance and dependent development as well as to evaluate the role of the foreign partner in the tripartite model.

The petrochemical industry, used as example in this book, is first described on a world scale, after which attention shifts to the development of Brazil's petrochemical industry. In a relatively short time Brazil has realized a tremendous growth in its

petrochemical sector. Possessing neither considerable oil reserves nor large capital stocks for importing huge amounts of oil, the country in 1985 reached the 11th place in the world ranking of petrochemical producers. One of the factors responsible for this success was the establishment of two integrated petrochemical complexes in which the government stimulated joint ventures between state enterprises, national private enterprises and foreign corporations.

In the era before the tripartite model was introduced, petrochemical production was dominated by several large foreign firms such as National Destillers, Phillips Petroleum and Scientific Design, which were located in the first petrochemical complex in the São Paulo region. During the period of military government following the military coup of 1964, a state bureaucracy emerged that was largely attached to foreign and local industrial capital. By creating state enterprises, the state became increasingly involved in the productive sphere of the economy. From that time onwards, government investment in the petrochemical industry continued and both the petrochemical state company, Petroquisa, and the National Development Bank, BNDES, played a significant role. Furthermore, several new national private entrepreneurs began investing in petrochemical projects in the sixties after which the triple alliance became reality.

The first petrochemical firms established in the form of tripartite joint ventures were located in the industrial conglomerate of São Paulo. The Brazilian government saw these spontaneously formed joint ventures as an optimal way to stimulate the petrochemical industry: foreign companies provide the necessary technology, state enterprises participate with their financial capital and provide access to material inputs, and the inclusion of the national private bourgeoisie gives legitimacy to the state. Since the tripartite model seemed advantageous for all three types of capital, the Brazilian government decided to use the tripartite model to establish a second petrochemical complex, located in the state of Bahia in northeast Brazil -the Camaçari complex- and a third complex, located in the south of Brazil -the Polosul. Companies wanting to invest in these complexes were obliged to create tripartite joint ventures.

The importance of the three participants in the tripartite model has been subject to change. With the creation of the Camaçari complex, the importance of state technocracy and national entrepreneurs increased in comparison to foreign firms. Although the influence of the state seemed to diminish when the third complex was established, it tried to increase its influence in the petrochemical industry by means of the National Petrochemical Programme (1987-1991). The national private entrepreneurs have been able to increase their importance in the petrochemical industry and maintain a relatively high level of investment in this sector. Regarding foreign participation in the tripartite model, some companies, such as Dow Chemical, tried hard to increase investments in the petrochemical industry outside the tripartite model. Others, like Rhone Poulenc and Mitsubishi, became very involved in tripartite joint ventures. Nevertheless their participation is also subject to change.

To obtain a clear picture of the functioning of the tripartite model, one petrochemical complex, the Camaçari complex, was selected for research on the firm level. By 1989, ten years after the Camaçari complex came on stream, fifty firms had been established around the central cracking unit, Copene, which provides the feedstock naphtha. Half of the total number of firms can be classified as downstream petrochemical companies. The other half consists of fine chemical firms, plastic transformation firms, and non-chemical-related firms, such as construction and metallurgical firms. Of the fourty-two chemical enterprises, twenty-four companies are joint ventures, of which eleven are tripartite joint ventures. Furthermore there are eight 100% foreign owned firms, seventeen 100% private nationally owned firms, and one state company. As a result of the government policy of using the tripartite model, several American, European as well as Japanese transnationals presently participate in the Brazilian petrochemical industry. The number of foreign companies present in the Camaçari complex is considerable; twenty-five in 1989 of which nine were American, nine European, and seven Japanese. Since the focus of this research is in particular on the role of foreign firms in the tripartite model, a central question is whether these foreign companies, coming from several different countries, possess similar characteristics and exhibit similar behaviour patterns in the tripartite joint ventures of Camaçari.

8.2. Differences between foreign investors: internationalization theories tested

When considering possible differences between foreign firms investing in Third World countries, it is necessary to pay attention to aspects on the level of firm organization, such as attitudes towards joint ventures, attitudes towards state participation, firm management, negotiation practices and corporate culture. Second, differences between foreign firms on a macro-level are dealt with, focussing on investment patterns and sectoral concentration.

8.2.1. Firm organizational aspects

The Camaçari complex contains various types of joint ventures, tripartite -including three different partners- as well as bipartite -with two partners. It is, therefore, interesting to examine the attitude of foreign firms towards participation in joint ventures, and minority joint ventures in particular. Remarkable similarities are revealed in comparing the findings of authors adhering to internationalization theories with those of this present research. Kogut, Hladik, Kojima, Sekichugi and Krause relate the motives of firms for participating in joint ventures with country origin. Consistent with their findings, this research concludes that American and European companies participate in petrochemical joint ventures in the Camaçari

complex primarily because of government pressure, whereas Japanese companies began participating in the Camaçari firms in order to gain access to resources and markets and because it created political goodwill in Brazil, a country in which they had only recently begun to invest. As a result, Japanese companies showed a more positive attitude towards participation as a minority partner in joint ventures; it was one of the few opportunities for them to gain access to an industrial sector that is largely dominated by Western transnationals.

State companies play an important role in the tripartite joint ventures of Camaçari, which raised a question about the attitude of foreign firms towards state involvement. The conclusion of Beamish that joint ventures involving a state firm[1] are particularly subject to instability and failure is in accordance with the findings of this present research: of all the joint ventures in Camaçari, those with a state firm do experience slightly more changes in ownership structure than joint ventures without state participation. To what extent do the attitudes of foreign firms towards state participation determine the stability of joint ventures? Authors, such as Dicken, Hladik and Nakase, agree that in general Japanese transnationals are more positive towards state participation than American, and to somewhat lesser extent European companies. For the Camaçari firms the same remarks can be made: in contrast to the Japanese executive managers who consider the participation of Petroquisa as indispensible for the stability of the joint venture, American and European managers say they strive for fully privately owned subsidiaries without direct state involvement. As a result, if American and European transnationals are in the position to buy out their state partner, they will not hesitate to do so.

Furthermore, foreign firms differ in their management structure. Two indicators are examined in somewhat more detail: i.e. joint venture control and corporate culture. First, Beamish states that control in the joint venture structure is a decisive factor for its overall performance: autonomously managed joint ventures perform better than joint ventures which are tightly controlled by the parent company of the foreign participant. With respect to this joint venture control differences exist between Japanese companies, on the one hand, and American and European firms, on the other. According to Taddesse, Barlett, Goshal and Negandhi, Japanese multinationals are characterized by their largely centralized organizational structure in which the subsidiary is closely tied to the parent company. Nevertheless, the participation of Japanese firms on a minority basis in joint ventures does not mean they do not possess mechanisms to influence the decision making process. The most important mechanism for Japanese firms to execute control over their joint ventures is installing Japanese executives in vital positions. In contrast, American and European companies, besides participating less often in minority joint ventures, more often appoint local managers. This is exactly the situation in Camaçari: joint ventures with Japanese participation appoint at least two Japanese executives. In addition to explicit company policy, this is because most of the Japanese manufacturing companies do not carry out investment in Brazil on their own, but cooperate closely with 'sogo shosha', Japanese trading companies. Both the 'sogo shosha' and the manufacturing company appoint their representative to the subsidiary. Related to

the question of control is the tendency of Japanese companies to appoint somewhat older and more experienced executives in the foreign subsidiary. By contrast, American and European transnationals tend to delegate executives who are in an early stage of their career.

Differences in corporate culture found in the literature of the internationalization theories correspond with the findings of this present research. Dunning, Negandhi and Rowland observe one aspect of the Japanese corporate culture that is very dominantly present and differs largely from the corporate cultures of Western and Third World companies. More precisely, in their negotiation strategy and planning practice, Japanese subsidiaries differ significantly from American and European subsidiaries. Whereas Japanese transnationals -especially in countries where previous experience is lacking- seem to have a long-term investment strategy and reach agreement only after thorough negotiations, American transnationals seem to operate much more on short term notice, and make their decision after a short period of negotiation. European subsidiaries are somewhere in between. As a result, American, and to a somewhat lesser extent, European transnationals are not only more flexible, but also more inclined to withdraw when things are not going as expected. The differences between foreign firms described in this section are on the firm level and result from intrinsic firm characteristics. It is worthwhile to examine whether the international investment pattern of companies is a distinguishing factor as well.

8.2.2. Macro-economic aspects: Kojima

An important contribution to the explanation of differences in investment patterns of foreign firms is given by Kojima. He is of the opinion that the different behaviour of American and Japanese foreign investments is related to differences in the direction of investments as well as their sectoral concentration. Kojima states that Japanese companies invest a larger part of their total foreign capital in developing countries than American firms, which invest predominantly in Western countries. Another difference he found lies in the size of foreign subsidiaries; Japanese foreign investments involve small subsidiaries whereas American firms establish large companies abroad. A sectoral difference noticed by Kojima is that Japanese firms concentrate on more traditional industrial sectors when investing abroad. American foreign investments, on the other hand, concentrate in technologically advanced industrial sectors.

Regarding foreign investments in Brazil, in the industrial sector in general, and in the petrochemical industry in particular, the ideas of Kojima can serve as an explanation of the differences observed between foreign firms. The history of Japanese foreign investments in Brazil differs largely from American and European foreign investments. Whereas in the fifties American firms started to invest on a large scale in Brazil, followed by European companies, Japanese transnationals did not arrive in this Latin American country until the sixties and seventies. In accordance with Kojima, the sectoral preference of Japanese companies is quite different

from that of American firms: the former tend to invest in more traditional sectors such as machinery and textile while the latter dominate in the technologically advanced industrial sectors, such as electronics, pharmaceuticals and engineering plastics. Although investments in the petrochemical branch show that Japanese transnationals are increasingly involved in more technologically advanced industrial sectors, they are still almost absent in the rather sophisticated fine chemical branch. No doubt, this sectoral investment pattern influences the attitude of Japanese firms in Brazil. Firstly, because of their relatively recent arrival in Brazil, Japanese companies do not have the same knowledge of the country as their American and European competitors. Secondly, since their interests in the chemical sector are limited to the petrochemical branch, Japanese companies do not have much flexibility of transfering investments to other sectors.

8.3. Impact of firm origin on the functioning of the tripartite model

To what extent do the observed differences between the participating foreign firms in the Camaçari complex influence the functioning of the tripartite model? For the evaluation of the functioning of this model in the Brazilian petrochemical industry two aspects are of importance: the transfer of technology and the stability of the tripartite joint ventures.

8.3.1. Stability of the joint venture structure

The degree of stability of tripartite and bipartite joint ventures in the complex of Camaçari is influenced by the different investment patterns of the foreign firms and their different firm characteristics. Since Japanese participants on the Camaçari complex began to invest in Brazil relatively recently, their lack of experience not only increased their willingness to participate in minority tripartite joint ventures, but also made them more positive about state participation. The state partner is needed to balance the dominance of the foreign firm and to compensate for the inexperience of the national firm. American and European firms possess another attitude towards state participation. Due to their longer experience in the petrochemical sector and with investment in Brazil, they prefer investment in the form of 100% ownership. Stability of joint ventures with Japanese participation is also enlarged because of the their long-term planning. Due to their relatively limited knowledge of the political and economic situation in Brazil, Japanese chemical transnationals will only invest after extensive planning and negotiation, whereas European and American foreign investors, partly because of their greater experience in the country, more rapidly decide to participate.

The impact of these differences on the stability of the Camaçari joint ventures is remarkable. To start with, tripartite joint ventures prove to be very unstable ownership structures; of the tripés represented in the Camaçari complex in 1989, 40% experienced a change in ownership structure, becoming either a bipartite joint venture or a 100% privately owned company. One hundred percent had a change in shareholder composition. But this change does not apply equally to all foreign participants. Above all joint ventures with European and American participation have experienced a change in ownership structure or shareholder composition. Petrochemical joint ventures in which Japanese companies participate, however, proved to be more stable and hardly experienced any change. Illustrative is the fact that the three Japanese chemical companies -Mitsubishi, Idemitsu and Sumitomo- which invested in the Camaçari complex from its start, are still participating in seven firms in 1989. In contrast to the stable nature of Japanese participation, the number and nature of American and European companies has changed greatly. Three American subsidiaries left the complex whereas three new American firms started to participate. The European firms show an even greater fluctuation: four firms left the complex and only one started to invest recently.

The result of these changes is that the number of tripartite joint ventures declined relatively sharply during the ten years of the complex' existence. In 1980, 42% of the firms were tripartite joint ventures, but by 1988 this figure had declined to only 19%. This decline can be attributed to both an increase in the number of new firms, mainly 100% privately owned companies -foreign as well as national- and to the disruption of several tripartite joint ventures. The tripartite model threatened to collapse because of disagreements between the partners. According to the managers of the Camaçari firms, there are two reasons for most of the failures: insufficient financial reserves of the national partner and disappointment on the part of the foreign partner. Other reasons mentioned, for example changing foreign firm policy or conflicts about technology and juridical reasons, seem to be of minor importance.

8.3.2. Technology transfer

Three phases are important in the process of technology transfer: origin of initially-used technology, investment in R&D, and the ability of a company to expand or diversify production with its own technology. To what extent does firm origin influence the transfer of technology in the Camaçari firms during these three phases?

First, regarding the purchase of the initially used technology, all joint ventures in the Camaçari complex obtained their technology either from the foreign participant or from another foreign technology supplier. The various foreign participants did not always provide the most up-to-date technology, because in some cases foreign companies possessing this technology did not want to participate in a minority joint venture. In this respect Japanese companies behaved different than American and European companies. In three cases on the Camaçari complex, negotiations with

potential American or European participants which possessed up-to-date technology, failed because they refused to participate as a minority shareholder in a tripartite joint venture. In all three cases Japanese companies, less reluctant to participate in joint ventures, were asked to join.

The second phase in technology transfer enhances investment in Research and Development. Generally, investments by the Camaçari-based companies are very limited. Most companies rely on the R&D efforts of the parent company of their participating foreign firm and do not carry out sophisticated innovative research themselves. Of all firms, only eleven carried out some R&D, focussing primarily on trouble shooting or debottlenecking, and only three companies had laboratories in which sophisticated research was carried out. In this regard, there was not much difference between joint ventures with Japanese, American or European participation.

Third, as a result of the limited investments in R&D and the limited technology transfer most Camaçari firms on the complex were unable to expand or diversify production with their own technology. A large number of firms had to buy new technology from the parent firm of their foreign partner or from external technology suppliers. Apparently, the tripartite model did not succeed in stimulating a smooth process of technology transfer, wich would have reduced the dependency of the Brazilian petrochemical companies on external, foreign technology supplies. Although there is no difference between the various foreign participants with respect to the purchase of technology needed for the expansion, there is a difference in the origin of this technology. While joint ventures with European and American participation rely slightly more on new technology from the parent company of the participating foreign firm, joint ventures with Japanese participation depend more on external technology suppliers. This is due to the more limited technological expertise of Japanese companies in the petrochemical industry. Because of their recent involvement in this sector, compared to American and European companies, the technological know how of Japanese companies is still limited to certain production processes. The external purchase of up-to-date technology for expansion of Camaçari-based joint ventures provides Japanese transnationals with a good opportunity to obtain access to new technology.

8.4. Ten Years Camaçari: results and analysis

Ten years after the petrochemical complex of Camaçari came on stream, it is possible to evaluate the success of the tripartite model in this complex. To what extent was national petrochemical development is stimulated and what is the contribution of the three partners to the tripartite model? The objectives of the Brazilian government in encouraging the national petrochemical industry were: import substitution of petrochemical products, creation of a larger group of national

entrepreneurs in the petrochemical sector, regional development and technology transfer in the Northeast.

First, import substitution of petrochemical products seems to have been successfully accomplished. In only one decade (1979-1989) the country changed from a net importer of petrochemical products into a net exporter. The construction of three petrochemical complexes enormously stimulated national production of basic chemicals such as ethylene, butadene and propane, and thermoplastics produced by downstream enterprises such as low-density polyethylene, high-density polyethylene, polyvinylchloride (PVC) and polystyrene. Since at the beginning of the eighties national demand for these products lagged behind the increased production, export was highly stimulated, amongst others, by export subsidies provided by the government. Whereas the export co-efficient was a negligible 2.7% in 1980, this figure had increased to 40% by 1986, changing the petrochemical sector into an important export sector.

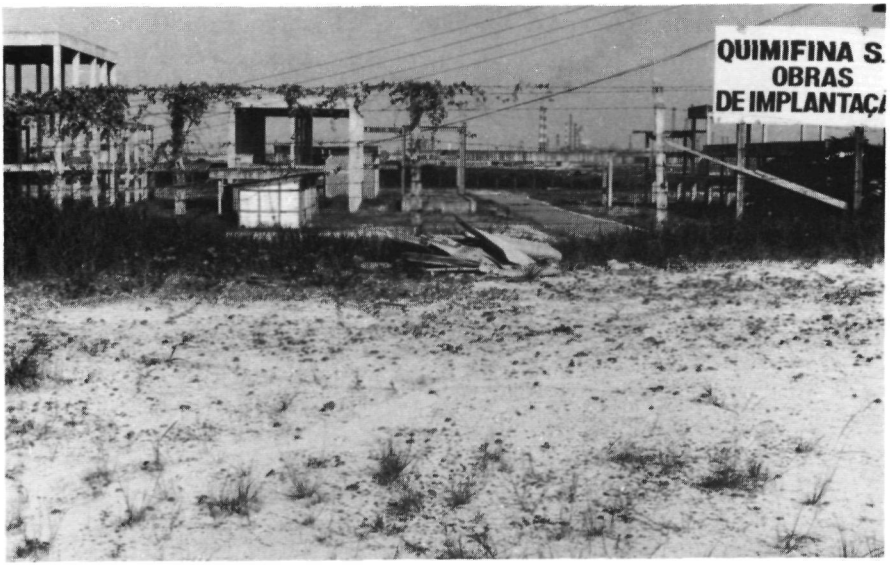
Creation of a group of national petrochemical entrepreneurs seems to have been less successful. Before the construction of the second and third petrochemical complex only a few national entrepreneurs invested in the petrochemical industry; among them sector-related companies such as the Ultra and the Unipar groups, Cevekol and Ipiranga. These four companies had their roots in the chemical sector and it was a logical step to invest in petrochemical production. For the non sector-related companies things were different. When the complex of Camaçari in the state of Bahia was planned, the Brazilian government considered this an excellent opportunity to increase the number of national petrochemical producers thereby forming a countervailing power to foreign domination. Several entrepreneurial groups, originating from the state Bahia, which did not possess any experience in petrochemical production, began to invest in Camaçari. The most important companies are the Mariani group and Banco Economico, both originating from financial conglomerates, and the Odebrecht group, a construction company. Smaller non sector-related groups are: Roche Miranda, Euvaldo Cruz and Camargo Correia. In the initial phase of the tripartite model the government seems to have reached its objective. But after some time most of the smaller family companies were bought out by either state companies or foreign firms, because they were unable to cope with the financial and technological requirements of the petrochemical sector, and only larger conglomerates functioned well. By the end of the eighties, the private national petrochemical companies were highly capitalized and still expanding inside and outside the petrochemical industry. But are they petrochemical entrepreneurs? Although the new petrochemical entrepreneurs viewed their activities in the petrochemical branch as highly beneficial, they do not reinvest their revenues in chemical R&D nor in expansion of their chemical firms. Instead, they chose to invest in their core activities like banking, real estate management and construction. In part, this behaviour can be attributed to the limited expansion possibilities in the chemical sector: since the central cracking units, which provide almost all inputs, are producing at their maximum production capacity, expansion of production in the downstream plants is restricted. In addition, extensive government control further

limits the construction of new plants. But the attitude of the national entrepreneurs themselves plays a significant role as well. The non sector-related entrepreneurs consider themselves to be investment holdings. They will invest in an industrial sector because it is lucrative business but as soon as business becomes less lucrative than their other activities, they will withdraw from this sector. The sector-related petrochemical entrepreneurs, such as the Unipar and Ultra group, exhibit a different behaviour, however, they invest in technological innovation and design strategies for investment in petrochemical production.

Third, construction of petrochemical complexes was meant to stimulate regional development, in particular in the backward northeast of the country, where the Camaçari complex was created. Although performance of the Camaçari firms was very satisfactory with profitability rates well above the national average, a question remains over the impact of these favourable economic figures on regional development. As a result of the integrated character of the complex -implying that the central cracking unit and downstream enterprises are located on one complex-inputs either originate from the complex itself or from outside the northeastern region. Due to the low degree of industrialization in the northeast, demand for petrochemical products is low, necessitating the marketing of most of products either in the industrial south or in other countries. Multiplier effects stimulating further industrial growth in the region are, therefore, limited. Furthermore, the capital intensive character of the Camaçari firms and the fact that only highly skilled technicians and engineers are employed, does not give rise to employment opportunities for the tens of thousands of unskilled workers in the northeast. The majority of the 25.000 skilled employees working in the Camaçari firms originate from the industrial south of the country whereas the thousands of unskilled migrants, who assisted in constructing the complex, lost their job after construction was finished. Impulses to technological development in the region prove to be rather limited as well, since most Camaçari companies delegate their R&D to the research center of the parent company providing the technology. Finally, regional state authorities have little opportunity to influence important decisions taken by the Camaçari firms, since all important decisionmaking centers are located outside the region. Although it cannot be denied that establishment of the Camaçari complex created certain advantages for regional development in the state of Bahia, the complex is an enclave of industrial development in a still largely underdeveloped region.

As already noted, the transfer of technology, the fourth objective, was not very successful in the Camaçari complex. Ten years after the Camaçari complex came on stream the insufficiency of the transfer of technology is obvious. In addition to the attitude and behaviour of foreign firms, several other reasons are responsible as well. First, the attitude of the national entrepreneurs, mainly those originating from non-chemical sectors, limited national technological development. Second, the government policy to create several small, mono-producing petrochemical firms hampered R&D: the mass of the Camaçari-based firms is too low to carry out efficient research.

Photograph 9: Barriers to diversification: construction of a fine chemical plant interrupted



Photograph 10: Regional development benefitting the happy few, appartments and slums in Salvador

Unfavourable technology contracts, limiting expansion of production with the acquired technology as well as adaptation of this technology, hampered further technological development. In summary after functioning for ten years in the Camaçari complex, it is clear that although the triparite model has accomplished import substitution of petrochemical products, the creation of a larger group of national petrochemical entrepreneurs, regional development and technology transfer were only partially realized.

Despite Camaçari's economic success, one can ask to what extent a dynamic industrial sector, capable of stimulating national industrial development has been generated. First, the joint ventures on the Camaçari complex are very unstable; in most joint ventures established in the first years of the complex' existence, either the ownership structure, or the shareholder composition changed. After ten years of petrochemical production, the popularity of the tripartite joint ventures in Camaçari has faded away. Second, if Camaçari-based firms want to expand or diversify production, they still have to rely on external technology, purchased from the parent company of the participating foreign firm, or from other foreign suppliers. Diversification of the Camaçari-based joint ventures to other chemical sectors, such as the fine chemical sector, is almost impossible. Technology used in this type of industry cannot be obtained on the free market and foreign dominance in this sector is too overwhelming. The failure of a large number of national investments in the fine chemical branch illustrates this. The result is that the petrochemical sector of Brazil is a rather static industrial sector in which further national capital accumulation is hampered.

After reviewing the empirical results of the triple alliance, more general questions come to the fore. A first question is to what extent the implications of the strategy of triple alliance influenced development in the petrochemical industry in Brazil in a positive sense and, secondly, what conclusions can be derived from this empirical study about the theories of dependent development.

8.5. The concepts of triple alliance and dependent development reviewed

According to Evans, a fundamental factor in the national development of Third World countries is national capital accumulation which can be achieved by integrating state, national private and foreign capital. Peripheral countries which have been dependent on industrialized center countries -resulting in stagnating industrialization- can realize dependent development by means of a triple alliance strategy. A certain degree of industrialization, characterized by national capital accumulation, can be achieved in this way. Nevertheless, Evans states that this strategy is far from perfect and some of its shortcomings can even result in failure of the strategy.

8.5.1. Constraints of the triple alliance: the findings of Evans

Exclusion of the majority of Brazil's population from the benefits of the triple alliance strategy forms a threat to the political stability in the country which could result in a declining capital accumulation. A direct threat to the stability of the triple alliance, however, is the internal division of the national bourgeoisie. Part of the local bourgeoisie creates alliances with foreign and state capital, alienating itself from the remainder of the bourgeoisie. A third constraint relates to the paradoxic nature of the dependent capitalist state. Although the state's primarily interest is national capital accumulation, it also possesses strong ties with international capital and tends to exclude part of the bourgeoisie as well as the mass of the population from political participation. Since state enterprises form an indispensible part of the tripartite model, privatization tendencies threaten collapse of the model.

A comparison of the findings of this present research, carried out on the firm level in one petrochemical complex in Brazil, with the conclusions of Evans, demonstrates that the constraints mentioned by Evans do not threaten the strategy of the triple alliance. Instead, it is the instability of the joint venture structures that forms a serious threat to the continuation of the triple alliance strategy and the possibility of achieving dependent development. In his research on the joint venture structures in the Camaçari complex, Evans doesd not mention this instability:

> "Overall, there have been surprisingly few significant shifts in the ownership of the pole's companies since the creation of the original companies (-)."[2]

Furthermore he does not point to the differing degrees of stability for different foreign participants. This present research, on the other hand, shows that Japanese partners in joint ventures prove to be more stable participants than American and European companies. The concept of triple alliance and the theory of dependent development do not explain these differences. Although Evans suggests that Japanese, European and American firms have different investment patterns, he does not mention the possible impact this can have on the triple alliance strategy.

It is, therefore, necessary to analyse the functioning of joint ventures on a firm level and to consult authors that pay attention to the differences between firms from various countries, such as Kojima, Dunning, Dicken, Nakase and Kogut. The first important author is Kojima since he relates differences between foreign enterprises to development in Third World countries. Based on research carried out in the seventies, Kojima concludes that Japanese foreign investment is more beneficial to industrial development in the Third World than American foreign investment. The larger part of total Japanese foreign investments directed to developing countries, the relatively small size of Japanese subsidiaries, and the concentration in more traditional industrial sectors, are indications of the more beneficial incorporation of Japanese investments to existing industries in a host country. Besides being less directed towards developing countries, American investments concentrate in technologically advanced industrial sectors. As a result, American subsidiaries remain isolated enclaves with only limited multiplier effects.

A few shortcomings of Kojima's research need to be mentioned, however. Kojima developed his ideas in a period during which Japanese foreign investments were largely directed towards developing countries. He fails to take notice of the more dynamic aspects and changing patterns of foreign investments. In the eighties Japanese companies increasingly invested in Western countries, the US in particular. The sectoral preferences of Japanese foreign investments also changed and more technologically advanced industrial sectors increased in importance. Another shortcoming is that Kojima's hypothesis is based on a macro-economic analysis, making it difficult to evaluate his findings on a firm level. Nevertheless, Kojima's ideas are of great interest for analyzing the influence of Japanese, American and European joint venture partners in the Camaçari complex on industrial development in Brazil.

8.5.2. Contribution of the internationalization theories

Because Kojima does not pay much attention to joint venture structures and the influence of firm origin on joint venture performance, internationalization theories focussing on micro-level can provide a valuable amplification. One of the authors analysing joint ventures structures from this perspective is Beamish. Examining the attitude of foreign firms in joint ventures, Beamish concludes that the stability of joint ventures is decisive for industrial development in Third World countries: stable joint ventures stimulate industrial development, while unstable joint ventures may largely hinder future industrialization. Furthermore, he concludes that foreign firms' motives for participating in joint ventures and their willingness to accept minority shares determine joint venture stability. In addition, attitudes towards state participation can influence joint venture stability. If his findings are combined with the ideas of other authors, such as Kogut, Negandhi, Dunning and Nakase, the conclusion is that firm origin decisively influences the attitude of foreign companies in joint ventures and is indirectly responsible for the development potential of these joint ventures in Third World countries.

From the authors cited above it is clear that Japanese investments are more likely to stimulate industrial development in the Third World than American investments. Kojima argued that Japanese investments are more easily incorporated into the peripheral country and that differences between national firms and Japanese investors are small, which facilitates technology transfer and incorporation of the foreign firm. Although several authors, such as Kogut, Dunning and Nakase, conclude that a relatively large number of Japanese companies invest in the form of joint ventures and that these joint ventures are among the most stable joint ventures -even when these joint ventures involve government participation- they do not make a correlation between the attitude of Japanese foreign investment and development perspectives. American and European foreign investments, in particular in Third World countries, often take the form of 100% subsidiaries. If minority shareholdings exist, they are often the result of strict government regulations on ownership. These

joint ventures, based on negative incentives, are not the most stable structures. As a result, changes in shareholder composition or ownership structure are frequent. Correlating these conclusions with the findings of Beamish, one can say that joint ventures with Japanese partners are more beneficial for industrial development in Third World countries than joint ventures with American or European participation.

8.5.3. Supplementing the theory of dependent development

What are the implications of these findings for Evans' concepts and the theory of dependent development? One of the key arguments in Evans' work is that the strategy of the triple alliance, enabled certain Third World countries to achieve dependent development by means of national capital accumulation. This suggests that national industrialization is possible for certain Third World countries, even though this industrialization still depends on center countries. They remain dependent because, amongst others, industrialization is not possible without the participation of foreign companies willing to invest in the Third World country.

Because Evans considers national capital accumulation to be the most important factor of development and did not further operationalize 'dependent development' it is difficult to measure the impact of the triple alliance strategy on industrial sectors. For the purpose of this research it is necessary to operationalize the concept dependent development in more detail in order to facilitate an empirical evaluation. National capital accumulation alone is not enough to secure industrial development in Third World countries. Industrialization is generated by means of dynamic industrial sectors, characterized by their ability to generate industrial expansion by means of more or less autonomous technological development and the possibility of vertical diversification. When this dynamism is absent, the industrial sector will experience stagnation and the production process will become obsolete, which can threaten national capital accumulation.

As previously stated, the use of the tripartite model in the Camaçari complex resulted in short-term economic success, but also paved the way for the stagnation of the petrochemical sector in Brazil, creating a situation in which expansion can only take place with external technology and diversification of production is difficult. One of the factors limiting the success of the strategy of triple alliance is the fact that no attention has been paid to the origin of foreign participants. The number of foreign firms willing to invest in Third World countries is increasing, and not only in absolute sense. Due to increasing internationalization, the number of countries involved in foreign investment is also mounting. Not only American and European investments in Third World countries are important; Japanese foreign investments are also increasing in importance. Given the larger number of foreign investments coming from different countries, the role of foreign investments in the development of Third World countries needs to be re-evaluated.[3] It is necessary to add the question of country origin to the consideration of development aspects. In

what way does the strategy of the triple alliance and the origin of the participating foreign firms influence the dynamism of peripheral industrialization?

First, investment patterns of the country of origin can influence the bargaining position of the host country. If foreign companies, Japanese for instance, do not have an investment tradition in certain Third World countries, they feel less comfortable investing for the first time. Second, the sectoral experience of the foreign investor is of great influence. An investing company with relatively little experience in a sector offers better perspectives for national development in the host country than an experienced foreign firm.

These two factors suggest that foreign firms are more willing to accept minority shares in joint ventures with national private entrepreneurs when based on a feeling of mutual necessity. As a consequence, a better relationship can be built with the already existing national private enterprises. The more stable joint ventures resulting from this stimulate national capital accumulation and, consequently, have a more beneficial impact on industrial development. In contrast, foreign companies long established in certain Third World countries, possessing extensive know-how in certain industrial sectors, more often possess a monopoly position in this sector and are reluctant to share this position with national private capital. Their participation can hinder further industrial development in the Third World country.

Third, intrinsic firm characteristics, such as attitude towards participation in joint ventures, management structure of the firm and corporate culture, including the negotiation practices, are important. Regarding these characteristics, it is once again evident that firm origin influences industrial development. For instance, Japanese companies are more willing to participate in minority joint ventures, even with state participation, results in more stable joint ventures. Their more extensive negotiation process may also result in larger stability; unexpected problems are less likely to occur. With respect to their management structure and corporate culture, Japanese foreign investors are more dominant. This research found, however, that Japanese participants were not considered dominantly present in the petrochemical joint ventures in Brazil. Japanese foreign investments which are more appreciated by Brazilian national private and state partners, can result in greater stability of joint ventures.

In conclusion, the origin of foreign companies strongly influences not only the functioning and the succes of the tipartite model, but also the strategy of the triple alliance. It makes a difference whether industrial sectors are characterized by domination of a few monopoly foreign companies from one country, or several smaller foreign companies from various different countries. The theories of dependent development do not further distinguish differences between foreign investments in Third World countries. By referring to 'the foreign investments' and considering foreign firms as a homogeneous group, dependent development authors underestimate the importance of differences between foreign investors and neglect the role of foreign-firm origin in the development of Third World countries. It is, therefore, necessary to reformulate dependent development theories and to make a distinction according to country of origin. Doing this, one must bear in mind that differences

between foreign firms are not static phenomena but will change over time. When Japanese companies gain more knowledge in particular industrial sectors or become more experienced in certain Third World countries, their willingness to participate in minority joint ventures will probably decline. This change in attitude can be illustrated by the different attitude of Japanese foreign investors in Southeast Asia and in Latin America. Japanese investments in Southeast Asia are more likely to dominate and can be found less frequently in minority joint ventures.[4]

8.6. Future prospects of Brazil's petrochemical industry

After the theoretical review of the importance of firm origin in the dependent development theories and the concept of the triple alliance, is it interesting to consider firm origin in relation to the future prospects of Brazil's petrochemical industry. In regard to the dynamics of the Brazilian petrochemical sector, both the stability of joint venture structures and the transfer of technology are of importance. In brief the tripartite model, as implemented by the Brazilian government in the Camaçari complex, seriously restricts further development of the Brazilian petrochemical industry. The petrochemical sector at present is very fragmented. It consists of small, mono-producing unstable joint venture companies, some including national private entrepreneurs lacking any previous experience in the chemical branch. In addition, a large number of foreign partners from different countries participate in the joint ventures. As a result, technological development in these tripartite joint ventures is severely hampered, reducing the possibilities for industrial expansion inside the petrochemical branch or towards the final chemical branch. Two options for future development of the Brazilian petrochemical industry will be given in which the importance of the origin of the foreign participant is taken into consideration.

The first option is the consolidation of the tripartite model in the form of stable tripartite joint ventures in which much attention is paid to adequate technology transfer. Future expansion and diversification of production are possible, because the foreign partner is obliged to transfer the necessary technology. Although the tripartite company will remain dependent on its foreign partner, a certain degree of national capital accumulation can be achieved. The present research made clear that this option will have more chance if the foreign partner in the tripartite joint venture is a Japanese subsidiary. European and American participants tend to disturb the stability of the joint venture since they do not choose to consolidate their shares in a minority shareholding with an inexperienced national entrepreneur and a state partner. Eventually they strive for 100% foreign ownership or leave the joint venture to its national owner. This option will be more viable with Japanese companies because they appear willing to participate in a minority joint venture. It is the question, however, whether Japanese subsidiaries, when they become more

acquaintanced with the Brazilian situation, will continue to follow the same joint venture policy.

The second option is the dissolution of the tripartite model. The joint ventures in the Camaçari complex that collapsed, for whatever reason, became 100% foreign-owned firms or 100% nationally owned firms. This process of industrial differentiation, already referred to by Evans, can lead to a situation in which 100% nationally owned firms dominate the petrochemical branch, while 100% foreign owned firms dominate the fine chemical branch. Differentiation alone is not a solution to limited development prospects of the petrochemical industry. If the tripartite model is completely abandoned, and 100% nationally owned companies control the downstream petrochemical enterprises, further technological innovation will become extremely difficult. Without foreign participants and lacking sufficient critical mass to invest in R&D, Brazilian petrochemical production could quickly become obsolete. Therefore, it is necessary to reform the petrochemical branch and stimulate mergers between the small mono-producing companies in order to create larger production entities that are able to generate their own R&D. The Brazilian government considers this second option to be a possible solution for the petrochemical sector. But, although the state technocracy largely stimulated the forming of petrochemical mergers, until 1989 only one merger succeeded. Not one single partner in the petrochemical firms has wanted to sell or diminish its share in the profitable chemical sector.

With respect to the second option, joint ventures with American and European participation are more advantageous than with Japanese transnationals. As is shown in this book, joint ventures with European and American participation are more subject to change because they have more options for investing in the fine chemical branch or changing their shares for investments in other industrial sectors. Japanese foreign firms are more reluctant to leave their minority joint ventures in the petrochemical companies because they can neither move to the fine chemical branch nor to other industrial branches. This is not only an obstacle for industrial differentiation, it can also hamper the merger possibilities of these tripartite joint ventures. For two tripés with different Japanese participants mergers are almost impossible.
Whatever course is chosen, the analysis of the influence of the tripartite model on industrial development in Brazil makes clear that firm origin is an important issue to consider.

Beamish primarily refers to bipartite joint ventures between foreign firms and state firms.
Evans, P., 1983, p 110.
For further research relating to this question, it is of interest to consider the role of multinational investments originating from Third World countries. What is their contribution to dependent development and do they connect better with national companies in Third World countries.
Oguro, E., Japan's direct investments towards Asia facing turning point, Digest of Japanese Industry and technology, no 217, pp 11-17.

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ANNEX 1. The ownership structure of firms located on the Camçari complex in 1989

name firm	partners	percentages of shares
EMCA	Atlantic Richfield	100
Ciba Geigy	Ciba Geigy	100
BASF	BASF	100
White Martins	Union Carbide Electric Furnace others	34 8 15 3 49 9
Cobafi	Akzo	100
Unirhodia	Rhodia do Brasil	100
Rhodia da Bahia	Rhodia do Brasil	100
SmithKline	SmithKline	100
Etoxilados	Ultra	100
CCB	Klabin	100
Ricinor	Imbasa others	95 5
CQR	Salgema others	99 72 0 28
CPB	Proquigel	100
Cata Nordeste	Banco Economico Cata Amazonian others	17 70 13
Quimica da Bahia	Oxiteno Norquisa	50 0 50 0
Nitroflex	Cevekol Norquisa Chemicon Moinha Santista Suzano	20 35 35 5 5
EDN	Dow Chemical Cevekol Petroquisa	33 3 33 3 33 3
CBP	Petroquimica da Bahia Petroquisa	50 50
Pronor	Petroquimica da Bahia Petroquisa	50 50
Nitrofertil	Petrofertil Petroquisa	99 86 1 14
Celbras (ex Fisiba)	Sinase Citybank	70 30
Silinor	Dow Corning Ipiranga	60 40
Policarbonatos	Pronor Idemitsu CBP	33.3 33.3 33 3

Politeno	Sumitomo	15
	C Itoh	15
	Conepar / Banco Economico	20
	Suzano	20
	Petroquisa	30
Norcom PuPont	Norcom	51
	DuPont do Brasil	49
Polibrasil	Shell	25
(ex Polipropileno)	Petroquisa	35
	Cevekol	15
	Ipiranga	10
	Suzano	15
Poliaden	Mitsubishi	16 8
	Nissoh Iwah	16 8
	Conepar / Banco Economico	33 3
	Petroquisa	33 3
Sansuy	Sansuy	77 06
	CPC	20 00
	Others	2 94
Nitroclor	Liquipar	20
	Norquisa	50
	Petroquisa	30
Nitrocarbono	Petroquimica Bahia	17 5
	Pronor	17 5
	Copene	40 3
	Petroquisa	24 6
Sulfab	Nitrocarbono	58
	Metacril	42
Melanor	Proman	97 5
	Cavalcanti	2 5
Copenor	Metanor	100
Metanor	Grupo Peixote do Castro	47 5
	Petroquisa	47 5
	Others	5 0
Carbonor	Solvay	25
	Carbo Branco	35
	Norquisa	40
Ciquine Quimica	Mitsubishi	26
	Nissoh Iwah	7
	Conepar / Banco Economico	33 5
	Petroquisa	33 5
Ciquine Petroquimica	Mitsubishi	26
	Nissoh Iwah	7
	Conepar /Banco Economico	33 5
	Petroquisa	33 5
Acrinor	Rhodia	35
	Unigel	4
	Petroquisa	35
	Copene	35
Liquid Carbonics	Liquid Carbonics	72 5
	Brahma	9
	Others	18 5
Deten	Unipar	35 6
	Una SA	28 6
	Petroquisa	35 6
	Others	0 2

CPC	Mitsubishi / Nissoh Iwah Odebrecht Petroquisa	33.3 33 3 33.3
Oxiteno	Ultra Cevekol Monteiro Aranha Petroquisa	28 28 6 28

De rol die buitenlandse bedrijven in het proces van industriële ontwikkeling in Derde Wereld landen spelen is diepgaand onderzocht door wetenschappers behorende tot verschillende stromingen waaronder de dependencia traditie. In hoofdstuk twee komt een onderzoek dat hiertoe een waardevolle bijdrage heeft geleverd ter sprake; het onderzoek dat Evans eind jaren '70, begin jaren '80 heeft uitgevoerd in Brazilië.

Evans' uitgangspunt is de theorie van dependent development waarin hij het concept triple alliantie centraal stelt. Volgens de dependent development theorie is industrialisatie in bepaalde Derde Wereld landen mogelijk als buitenlands kapitaal, staatskapitaal en nationaal privé-kapitaal een onderlinge alliantie aangaan. Hierdoor kan een bepaalde mate van nationale kapitaalsaccumulatie bereikt worden die het betreffende land in staat stelt autonome industrialisatie te bevorderen. Ondanks dat deze perifere industrialisatie van een gedisarticuleerd karakter is en de afhankelijkheid van centrumlanden blijft voortduren, maakt stagnatie in de industriële sector plaats voor een afhankelijke ontwikkeling.

Het concept van de triple alliantie is door Evans toegepast op de petrochemische industrie in Brazilië. In de zestiger en zeventiger jaren heeft de Braziliaanse overheid een beleid gevoerd waarin door middel van de triple alliantie de nationale ontwikkeling van de petrochemie is bevorderd. Alleen de vestiging van petrochemische bedrijven in de vorm van tripartite joint ventures van een staatspartner, een buitenlandse partner en een nationale privépartner, werden toegestaan. Deze tripartite joint ventures zijn vooral belangrijk in het petrochemisch complex van Camaçari, dat gelegen is in het noordoosten van het land. Voorwaarde voor succes van de triple alliantie strategie is volgens Evans dat een grote internationale kapitaalmarkt ervoor zorg moet dragen dat de staatsoverheid in ruime mate kan investeren zonder daarvoor interne reserves te moeten aanspreken.

Hoewel Evans de constellatie van de triple alliantie als een enorme stimulans voor perifere industrialisatie beschouwde, zag hij ook enkele beperkingen in deze strategie die op den duur het succes van de strategie in het realiseren van een afhankelijke ontwikkeling zouden kunnen bedreigen. Een eerste beperking vormen de interne contradicties binnen de staatstechnocratie. Enerzijds vervult de staat, geliëerd aan het internationale kapitaal, een productieve rol binnen de industriële sector, terwijl zij anderzijds ook een regulerende en repressieve rol binnen de samenleving heeft, ten einde hoge nationale kapitaalsaccumulatie cijfers te waarborgen. Een tweede beperking is de interne verdeeldheid van de nationale bourgeoisie waarvan een deel allianties heeft aangegaan met het internationale kapitaal terwijl een ander deel buiten deze allianties om opereert.

Doelstelling van het onderzoek

Evans baseert zijn analyse van de triple alliantie grotendeels op het petrochemisch complex van Camaçari dat begin jaren zeventig is opgezet. Daar hij zijn onderzoek omstreeks 1979 afsloot is het interessant te analyseren hoe de triple alliantie zich sindsdien heeft ontwikkeld. De doelstelling van mijn onderzoek is daarom een analyse te geven van de rol die de triple alliantie speelt in de ontwikkeling van de petrochemische industrie in Brazilië in het algemeen en op het Camaçari complex in het bijzonder, en de rol van de buitenlandse partner daarin aan een nadere beschouwing te onderwerpen.

Het is vooral de bijdrage van de buitenlandse partner die mijns inziens in het onderzoek van Evans enigszins onderbelicht blijft. Howel Evans de interne contradictie van de staatstechnocratie en de interne verdeeldheid van de nationale bourgeoisie als belemmerende factoren voor het succes van de triple alliantie beschouwt, behandelt hij de buitenlandse partners als een homogene groep investeerders, die, ondanks dat ze afkomstig zijn uit een toenemend aantal herkomstlanden, een overeenkomstig gedrag vertonen. Dat een dergelijke generalisatie geen correct beeld van de werkelijkheid geeft, blijkt uit de bevindingen van diverse auteurs behorende tot de stroming van internationaliseringstheorieën. Zo concludeert Kojima dat, als gevolg van hun specifieke investeringspatronen, Amerikaanse bedrijven vergeleken met Japanse bedrijven een minder gunstige invloed uitoefenen op industriële ontwikkeling in Derde-Wereldlanden. Ook auteurs die specifiek onderzoek hebben verricht naar de invloed van herkomst op het gedrag van multinationals in joint venture structuren, zoals Kogut en Beamish, concluderen dat het gedrag van Japanse, Amerikaanse en Europese investeerders niet overeenkomstig hoeft te zijn. De belangrijkste vraag in mijn onderzoek betreft de invloed van herkomst van buitenlandse investeerders op het succes van de strategie van triple alliantie in dependent development.

Ontwikkeling van de petrochemie in Brazilië

In hoofdstuk drie wordt dieper ingegaan op de specifieke industriële branche waarop dit onderzoek zich richt; de petrochemie en de plaats die deze inneemt binnen de chemische sector. Voor een beter begrip van deze branche is het belangrijk een beeld te hebben van de drie verschillende generaties bedrijven die tesamen de productieketen van de chemische sector vormen: de centrale kraakinstallatie die de nafta omvormt tot ethyleen, de downstream bedrijven die de ethyleen verwerken tot onder andere pvc, polyethyleen en estyreen, en de bedrijven die verantwoordelijk zijn voor de eindproducten van de chemische industrie zoals de plastic-, kunstmest- en rubberbedrijven.

Wanneer vraag- en aanbodcijfers van de Braziliaanse petrochemie voor de jaren zeventig en tachtig worden bekeken valt onmiddellijk de enorme toename van de productie op. Ook de export van petrochemische producten vertoont een spec-

taculaire stijging. Terwijl in 1970 nog 22.000 ton pvc geïmporteerd wordt, bedraagt vijftien jaar later de export van hetzelfde product 34.000 ton per jaar.

In hoofdstuk vier is aandacht besteed aan de drie petrochemische complexen die in de zestiger en zeventiger jaren in Brazilië zijn opgezet. Eind zestiger jaren ontstonden in São Paulo de eerste petrochemische bedrijven, in eerste instantie bestaande uit joint ventures tussen Amerikaanse bedrijven zoals National Destillers, Phillips Petroleum en Scientific Design en de nationale privé bedrijven Ultra en Unipar. Toen, als gevolg van financiële problemen, de nationale partners hun aandeel wensten te verkopen en een failliet van de petrochemische bedrijven onafwendbaar leek, besloot de staatstechnocratie in te grijpen. Petroquisa, een speciaal daartoe gecreëerde dochteronderneming van de staatsoliemaatschappij Petrobras, kocht een deel van de aandelen van de bedreigde bedrijven en werd de derde partner in de aldus ontstane tripartite joint ventures.

Gestimuleerd door het succes van deze eigendomsstructuur, die voordelen leek te bieden aan alle partijen, besloot de overheid dit concept toe te passen in twee nieuw te stichten petrochemische complexen. De met dit beleid beoogde doelstellingen waren: importsubstitutie van petrochemische producten, vergroting van de groep nationale petrochemische ondernemers, ontwikkeling van technologische kennis en de regionale ontwikkeling van relatief weinig geïndustrialiseerde regio's. In 1979 startte het Camaçari complex in het noordoosten van Brazilië in de staat Bahia en enkele jaren later kreeg ook het zuiden van het land een eigen petrochemisch complex, de Polosul, in de staat Rio Grande do Sul.

In beide complexen speelde het concept van de triple alliantie een grote rol. In Camaçari bestonden alle 10 downstream bedrijven die in 1979 waren gesticht uit joint ventures tussen nationaal privé-, staats- en buitenlands kapitaal en in de Polosul startten in 1982 vijf tripartite joint ventures. Het aantal verschillende buitenlandse petrochemie bedrijven dat participeert in de Camaçari bedrijven is aanzienlijk. In 1979 waren veertien verschillende multinationale bedrijven aanwezig, afkomstig uit zowel de VS, Europa als Japan. In 1989 waren dit er vijfentwintig. Ook het aantal nationale privé-bedrijven dat in het Camaçari complex is te vinden is aanzienlijk. Naast bedrijven die afkomstig zijn uit de olie- of plastic sector, investeerde ook een aantal branche-vreemde bedrijven in de petrochemie. Het overheidsbeleid om een groter aantal nationale ondernemers te betrekken bij de petrochemie resulteerde in investeringen van financiële conglomeraten als Banco Economico en Grupo Mariani en constructiebedrijven als Grupo Odebrecht. De staat participeert in het Camaçari complex met haar staatsbedrijf Petroquisa en door middel van de nationale ontwikkelingsbank BNDES.

Het Camaçari complex

Binnen de Braziliaanse economie neemt het Camaçari complex een belangrijke plaats in; meer dan de helft van de Braziliaanse petrochemie productie vindt hier plaats. Daarom is voor dit complex gekozen voor het uitvoeren van het onderzoek naar de

bijdrage van de buitenlandse bedrijven aan de triple alliantie. In totaal zijn er in de tien jaar dat dit complex bestaat ongeveer 50 bedrijven gesticht waarvan de helft tot de petrochemische sector behoort. De andere helft bestaat uit fijne chemie-, plastic transformatie- en kunstmestbedrijven.

Naast een bedrijfsenquête in alle 43 chemische bedrijven zijn diepte-interviews afgenomen met vertegenwoordigers van de drie partners die deelnemen in het tripartite model: de staatstechnocratie, de verschillende buitenlandse bedrijven en de nationale privépartners. In hoofdstuk vijf worden de gegevens, verkregen uit de bedrijfsenquête, weergegeven. Uit de cijfers blijkt dat de winstgevendheid van de kapitaalsintensieve petrochemiebedrijven op het Camaçari complex hoger is dan het landelijk gemiddelde. De plastic- en fijne-chemiebedrijven laten een heel ander beeld zien. De eerste categorie behoort tot de arbeidsintensievere bedrijven en hun winstgevendheid is laag te noemen. De fijne chemiebedrijven daarentegen zijn erg arbeidsextensief maar hebben een hoge winstgevendheidsindex.

Een belangrijk kenmerk van de bedrijven in Camaçari is natuurlijk de eigendomsstructuur en, daaraan gerelateerd, de herkomst van de investeringen. De niet-preferente aandelen in de tripartite bedrijven zijn over het algemeen gelijkelijk verdeeld tussen de drie aandeelhouders: de staatspartner bezit 33.3%, de buitenlandse partner(s) 33.3% en de nationale partner(s) 33,3%. Het grootste deel van het geïnvesteerd vermogen van de bedrijven is echter afkomstig uit de staatskas, hetzij via directe participatie van de staatsondernemingen Petroquisa of BNDES, hetzij indirect via subsidieregelingen, investeringen in infrastructuur, of het overheidsprogramma FINOR. De buitenlandse ondernemingen hebben slechts in geringe mate bijgedragen aan de financiële investeringen; zij participeerden voornamelijk met technologie. Ook de nationale privé-bedrijven droegen weinig bij aan het financiële kapitaal. De eigendomsstructuur die op deze manier is ontstaan is daardoor niet zozeer een directe afspiegeling van de investeringsbijdrage maar veeleer het gevolg van een overeenkomst tussen de verschillende partners om de niet-preferente aandelen gelijkelijk te verdelen. Het gevolg was dat sommige multinationale ondernemingen met een bijdrage van slechts 2% in het financiële kapitaal, 33% van het aandelenkapitaal verkregen.

In 1989 telde het complex van Camaçari 11 tripartite joint ventures. Het aantal bipartite joint ventures -met twee verschillende typen kapitaal- bedroeg in dat jaar 13. Tevens waren er in het Camaçari complex acht bedrijven 100% dochter van een transnationale onderneming en 17 in 100% nationaal eigendom. Eén bedrijf was geheel in handen van de overheid via het staatsbedrijf Petroquisa.

De beslissing om het complex van Camaçari te vestigen in een regio met een geringe industrialisatiegraad die bovendien veraf ligt van de belangrijkste markten in het land, had voornamelijk tot doel regionale ontwikkeling te stimuleren. De overheid -en dan vooral de deelstaatsoverheid van Bahia- ging er vanuit dat een petrochemische industrie, met zijn sterke forward en backward linkages, een stimulans zou betekenen voor de regionale ontwikkeling van Bahia. Maar tien jaar na haar start kan het complex slechts worden beschouwd als een rijke, moderne enclave in een nog immer perifere regio. De invloed van het complex op de

regionale ontwikkeling van Bahia is gering: de kapitaalsintensieve en arbeidsextensieve petrochemische bedrijven blijken vooral linkages te hebben met het industriële zuiden van Brazilië en genereren weinig directe werkgelegenheid terwijl verdere industrialisatie ook niet wordt bevorderd. De impuls voor technologische ontwikkeling is gering te noemen omdat het merendeel van de bedrijven zijn onderzoek uitbesteed aan R&D centra die zich bevinden in westerse landen of in het industriële zuiden van Brazilië. Een positieve factor voor regionale ontwikkeling zou de hogere belastingopbrengst in de staat Bahia kunnen zijn, ware het niet dat deze grotendeels moet worden aangewend om enerzijds de infrastructuur binnen het complex op peil te houden en anderzijds de problemen die zijn ontstaan als gevolg van de komst van het complex -zoals milieuvervuiling- op te lossen.

Joint venture stabiliteit en technologie overdracht

Wat betreft haar invloed op de Braziliaanse economie, lijkt het Camaçari complex een groot succes te zijn: Brazilië is in enkele decennia veranderd van een land dat het grootste deel van zijn petrochemische producten moest importeren in een petrochemisch exporterend land. Een interessante vraag is echter welke bijdrage het tripartite model leverde aan het succes van het Camaçari complex. In hoofstuk zes wordt het functioneren van het model uiteengezet waarbij de stabiliteit van de joint ventures en de invloed van het tripartite model op de technologietransfer voorop staan.

Wanneer de verandering in eigendomsstructuur van de Camaçari bedrijven bekeken wordt, valt de grote instabiliteit van de joint ventures op. Van alle 50 bedrijven op het complex veranderde 64% in de loop van de tijd van aandeelhoudersstructuur. Nog opvallender is dat 38% van eigendomsstructuur veranderde, wat inhoudt dat één of meerdere aandeelhouders alle aandelen aan een ander type bedrijf verkochten. Vooral de tripartite joint ventures bleken zeer instabiel te zijn en maakten allen een verandering in aandeelhoudersstructuur door. Voor een groot aantal bedrijven betekende deze verandering echter tevens een wijziging in de eigendomsstructuur; ze veranderden bijvoorbeeld van een tripartite joint venture in een bipartite joint venture of in een bedrijf met slechts één aandeelhouder. Behalve uit het feit dat de tripartite joint ventures het meest instabiel bleken, is ook de populariteit van joint ventures afgenomen, want nieuwe bedrijven, die in de tien jaar dat het Camaçari complex functioneerde opgericht werden, bleken meestal niet te bestaan uit tripartite of bipartite joint ventures. Sinds de start van het complex nam daardoor het aantal joint ventures relatief gezien af van 63% naar 48% en nam het aantal bedrijven in 100% eigendom toe van 33% naar 50%.

Er zijn verschillende redenen voor de dalende populariteit van joint ventures. Ten eerste is dat de aanwezigheid van branche-vreemde nationale bedrijven in de Camaçari joint ventures. Verscheidene van deze nationale ondernemers waren niet voorbereid op de enorme kapitaalsinvesteringen die de petrochemische industrie vergt en moesten noodgedwongen na enkele jaren hun aandeel verkopen.

Een tweede oorzaak is het gedrag van de buitenlandse partner. In enkele bedrijven onstonden conflicten over onvolledige technologie transfer die het buitenlands bedrijf deden besluiten te vertrekken. In andere joint venutures gaf het buitenlandse bedrijf er de voorkeur aan om elders een nieuwe buitenlandse dochteronderneming in 100% eigendom te beginnen.

Wanneer deze veranderingen in aandeelhoudersstructuur of eigendomsstuctuur gerelateerd worden aan de herkomst van de buitenlandse partner, blijkt dat joint ventures met Japanse bedrijven stabieler zijn dan joint ventures met Amerikaanse of Europese partners. De joint ventures, waarvan de eigendoms- of aandeelhoudersstructuur veranderde, hadden in de meeste gevallen een Europese of een Amerikaanse partner. Japanse bedrijven daarentegen bleken zeer stabiele tripartite joint venture partners te zijn. De drie Japanse multinationals die, vanaf de start van het complex, in zeven tripartite joint ventures deelnamen (Mitsubishi, Sumitomo en Idemitsu) participeerden in 1989 nog steeds in nagenoeg dezelfde bedrijven. Van de Amerikaanse bedrijven besloten drie bedrijven het complex te verlaten en drie nieuwe VS bedrijven kochten aandelen in (andere) bedrijven op het complex. De Europese multinationals laten een nog fluctuerender beeld zien, vier van hen desinvesteerden terwijl een ander juist startte in een tripartite joint venture.

De bijdrage van het tripartite model aan de ontwikkeling van de Braziliaanse petrochemie kan ook beoordeeld worden aan de hand van de technologie transfer in deze sector. Verscheidene Braziliaanse onderzoekers zoals Teixeira, Amilcar en Neves da Rocha zijn van mening dat tripartite joint ventures uitstekende condities scheppen voor een transfer van petrochemische technologie van de buitenlandse partner naar de nationale partner. Immers, alle partijen zijn er bij gebaat dat de joint venture waarin zij participeren over geavanceerde technologie beschikt die goed geabsorbeerd is in het bedrijf. Nadere beschouwing van de technologie transfer in de Camaçari bedrijven leert dat dit positieve beeld enigszins genuanceerd dient te worden. Globaal kunnen drie fasen in technologie transfer onderscheiden worden: de aankoop van nieuwe technologie, de absorptie van technologie in het productieproces in het betreffende bedrijf en het verder ontwikkelen van de betreffende technologie door middel van innovaties. Wanneer deze drie fasen alle drie doorlopen zijn, is er sprake van een succesvolle technologie transfer. Voor de eerste fase geldt dat de Camaçari bedrijven niet altijd de meest recente technologie hebben weten te verkrijgen. Een aantal bedrijven heeft daarom second-best technologie aangeschaft. Deels was deze keus ingegeven door de prijs van de technologie, deels bleek het ook niet mogelijk om bedrijven die de beste technologie bezaten ertoe te bewegen te participereren op basis van een minderheidsaandeel in een joint venture.

De tweede fase van technolgie transfer is redelijk succesvol verlopen voor de Camaçari bedrijven. Ondanks dat veel managers claimen problemen te hebben met bijvoorbeeld restrictieve technologie-contracten, blijkt dat absorptie en debottlenecking in de meeste gevallen heeft plaatsgevonden.

Voor de laatste fase geldt echter dat de technologische ontwikkeling in de Camaçari bedrijven beperkt is gebleven. Om innovaties te kunnen doorvoeren is het noodzakelijk dat in bepaalde mate onderzoek wordt verricht in het bedrijf zelf. In Camaçari zijn slechts weinig bedrijven te vinden die over een eigen onderzoekscentrum beschikken. Dit heeft tot gevolg dat de meerderheid van de bedrijven op het Camaçari complex, wanneer zij het productievolume willen uitbreiden, afhankelijk is van extern verworven technologie. De technologische ontwikkeling in het petrochemie productieproces gaan relatief snel en een verouderd technologisch proces tast de competitiviteit van de productie aan. Het feit dat veel Camaçari bedrijven hun productie willen diversifiëren vergroot eveneens de afhankelijkheid van externe technologieleveranciers.

Voor deze onvolledige technologische ontwikkeling zijn verschillende redenen aan te wijzen die voor een deel samenhangen met het tripartite model en de manier waarop dit model is geïmplementeerd. Allereerst is dat het beleid van de Braziliaanse overheid. De doelstelling om het aantal nationale ondernemers in de petrochemische branche te vergroten heeft ertoe geleid dat in deze branche vele, kleine, monoproducerende bedrijven gevonden worden. Daarbij komt dat in een relatief groot aantal joint ventures een nationaal bedrijf participeert dat afkomstig is uit een branche-vreemde sector en daardoor weinig tot geen kennis bezit van het petrochemische productieproces. Het eerste bezwaar dat kan worden aangevoerd tegen dit beleid is dat voor een efficiënt R&D een bepaalde kritische massa vereist is die niet gerealiseerd kan worden door de te kleine Camaçari bedrijven. Het feit dat elk bedrijf slechts één of enkele producten produceert maakt dat er slechts één soort technologie in het bedrijf is, hetgeen R&D gericht op productdiversificatie moeilijk maakt. Een ander bezwaar is dat nationale ondernemers, die afkomstig zijn uit de financiële en constructiesector, hun prioriteiten bij voorkeur leggen bij hun kernactiviteiten en minder geneigd zijn in petrochemische R&D te investeren.

Tenslotte kunnen buitenlandse ondernemingen de technologische ontwikkeling van de Camaçari bedrijven negatief beveïnvloeden. Allereerst hebben zij in de eerste fase van technologie transfer niet altijd de meest up-to-date technologie ingebracht. Vooral de grote Amerikaanse en Europese bedrijven waren niet geneigd te participeren met hun technologie. Japanse bedrijven echter bleken hiermee minder moeite te hebben. Dit kan een reden zijn dat er relatief veel joint ventures met Japanse deelneming in het Camaçari complex zijn te vinden. Ten tweede werd technologie transfer bemoeilijkt doordat technologiecontracten beperkt van opzet waren. In contracten waren bijvoorbeeld clausules opgenomen die verdere R&D met deze technologie onmogelijk maakten. Hierin is niet veel verschil tussen Amerikaanse, Japanse en Europese multinationals te onderkennen.

Het feit dat weinig R&D door de Camaçari bedrijven werd verricht terwijl de petrochemische proces-technologie allerlei technologische ontwikkelingen doormaakte, noodzaakte de meeste Camaçari bedrijven nieuwe technologie aan te kopen. Maar juist de participatie van een buitenlandse multinational in de tripartite of bipartite joint ventures kan hiervoor een barrière vormen. Moederbedrijven van participerende buitenlandse partners zullen proberen de joint venture hun technologie te verkopen,

zelfs als deze technologie niet de meest geschikte, de meest up-to-date of de goedkoopste is. Beschikt het moederbedrijf echter niet over de benodigde technologie, dan moet extern technologie aangekocht worden. Er zullen echter weinig multinationals geneigd zijn hun up-to-date technologie te verkopen aan een joint venture waarin een ander buitenlands bedrijf participeert of zelfs in geparticipeerd heeft. Joint ventures waarin Japanse bedrijven participeren blijken sneller extern technologie aan te kopen dan Amerikaanse en Europese joint ventures die vaker opnieuw bij het moederbedrijf aankloppen. Dit is vooral het gevolg van de relatief geringere technologische kennis van de Japanese petrochemie multinationals. Door hun langere ervaring met petrochemieproductie, bezitten Amerikaanse en Europese bedrijven relatief meer technologische kennis en zijn zij in staat de joint venture te dwingen hun technologie aan te kopen.

Invloed van herkomst van het buitenlands bedrijf

Het blijkt dat tripartite joint ventures niet in alle opzichten even succesvol zijn. Het onderscheid dat gemaakt dient te worden tussen joint ventures met Japanse participatie en joint ventures met Europese of Amerikaanse participatie wat het succes van de tripartite joint venture betreft, wordt in hoofstuk zeven nader uitgewerkt.

Allereerst verschilt het investeringsproces in bedrijven van verschillende nationaliteit. Terwijl Amerikaanse en Europese bedrijven reeds een lange investeringstraditie bezitten in Latijns Amerika in het algemeen en in Brazilië in het bijzonder, zijn Japanse multinationals pas in de zestiger en zeventiger jaren gestart met investeringen in dit land.

Voorts bestonden er lange tijd grote verschillen in sectorale concentratie van de buitenlandse investeringen. Japanse bedrijven concentreerden hun investeringen in Brazilië in meer traditionele industriële sectoren zoals de textiel- en de zware machine-industrie terwijl Amerikaanse en Europese investeringen meer gericht waren op de geavanceerdere industriële sectoren zoals de chemie, electronica en autoproductie.

Tenslotte is er een verschil wat betreft de kennis van petrochemische procestechnologie, die, doordat Japan pas recent is gaan investeren in deze sector, relatief gering is. Als gevolg hiervan hebben Japanse multinationals minder kennis van het investeringsklimaat in Brazilië waardoor ze voorzichtig opereren in de Westers gedomineerde petrochemische sector in dit land. Hun bereidheid om op minderheidsbasis te participeren in bi- of tripartite joint ventures met nationale en staastbedrijven wordt hierdoor vergroot. Dit in tegenstelling tot Amerikaanse en Europese bedrijven, die slechts zullen overgaan tot deelname met minderheidsaandelen in een bi- of tripartite joint venture wanneer er reglementair gezien geen andere mogelijkheid is om te investeren in een lucratieve industriële sector als de petrochemie.

Zoals het voorbeeld van de Braziliaanse petrochemische industrie aantoont, zijn deze laatste joint ventures niet de meest stabiele eigendomsstructuren.

Ook op bedrijfs-niveau blijkt het verschil in stabiliteit tussen joint ventures met Japanse bedrijven en joint ventures met Europese en Amerikaanse multinationals. Ten eerste staan Japanse bedrijven positiever ten opzichte van participatie in joint ventures vergeleken met Amerikaanse en Europese bedrijven. Bovendien wordt participatie van staatsbedrijven in joint ventures door Japanners als positief ervaren. Ook deze factoren blijken een gunstig effect te hebben op de stabiliteit van joint ventures in Camaçari.

Een tweede onderscheid doet zich voor in de bedrijfs-organisatorische structuur. In joint ventures met Japanse participatie zijn in de meeste gevallen meerdere Japanse managers aanwezig die dan bovendien in een wat later stadium van hun bedrijfscarrière naar het buitenland gezonden worden. Ondanks het grotere aantal Japanse managers in de Camaçari bedrijven wordt hun invloed op de directe bedrijfsvoering door de nationale managers als minder dominant ervaren dan de invloed van Amerikaanse of Europese mangers die meestal in een eerder stadium van hun carrière uitgezonden worden.

Een derde verschil tussen de participerende multinationals in Camaçari is de bedrijfscultuur. Japanse multinationals kenmerken zich door een andere beslissings- en onderhandelingsstructuur dan Amerikaanse en in wat mindere mate, Europese bedrijven. Terwijl vooral Amerikaanse bedrijven een korte termijn planning hebben en snel beslissingen nemen waarbij een klein aantal managers betrokken is, streven Japanse bedrijven naar een langere termijn planning waardoor onderhandelingen langduriger van aard zijn. Daarbij lopen Japanse onderhandelingen veelal over een groot aantal schijven en is er een groot aantal managers bij betrokken. Het resultaat van deze onderhandelingsstructuur is dat het Japanse bedrijf anticipeert op eventuele problemen hetgeen stabielere joint ventures kan opleveren.

Conclusie

In het slothoofdstuk wordt het empirisch onderzoek dat uitgevoerd is in het petrochemisch complex van Camaçari gerelateerd aan de theorie van dependent development zoals deze door Evans is toegepast in Brazilië. Uit het onderzoek blijkt dat de verschillen die te onderkennen zijn tussen de multinationals in Camaçari, op zowel macro-economisch gebied als op bedrijfs-organisatorisch terrein, invloed uitoefenen op de rol die deze buitenlandse bedrijven spelen in het tripartite model. De stabiliteit van het tripartite model is groter in het geval van Japanse participatie in joint ventures dan in het geval van Amerikaanse of Europese participatie. Doordat instabiliteit van joint ventures een negatieve uitwerking heeft op de ontwikkeling van een industriële sector, wordt nationale kapitaalsaccumulatie hierdoor negatief beïnvloed.

Op basis van zijn onderzoek signaleert Evans een aantal factoren die bedreigend zouden kunnen zijn voor het succes van de strategie van de triple alliantie voor

dependent development. Het gedrag van de buitenlandse partner in de alliantie ziet hij echter niet direct als destabiliserende factor. Door buitenlandse investeerders in Brazilië, die afkomstig zijn uit verschillende herkomst gebieden, als een homogene groep te beschouwen en te veronderstellen dat zij een overeenkomstig gedrag vertonen, gaat Evans naar mijn mening voorbij aan het specifieke karakter van multinationale bedrijven zoals dat wordt bepaald door hun herkomst. De toenemende internationalisatie van productie heeft ertoe geleid dat het patroon van buitenlandse investeringen in Derde-Wereldlanden een zeer divers karakter is gaan vertonen. Een analyse van de effecten van buitenlandse investeringen op industriële ontwikkeling in Derde-Wereldlanden is daarom onvolledig wanneer geen aandacht wordt besteed aan de invloed die de herkomst van de buitenlandse investeerder hierop kan uitoefenen. Het is noodzakelijk dat de dependent development theorie aangevuld wordt met bevindingen afkomstig uit de internationaliseringstheorieën. De resultaten van het onderzoek van Kojima kunnen hiertoe gebruikt worden, evenals de bevindingen van onder meer Beamish, Kogut en Dunning. De theorie van dependent development, waarin industriële groei in de periferie verklaard wordt met de strategie van de triple alliantie, kan een bijdrage leveren aan de analyse van internationaliserings-processen in de Derde Wereld, mits aandacht wordt besteed aan het belang van herkomst van buitenlandse bedrijven.

CURRICULUM VITAE

Wilma Roos was born in Amersfoort on the 13th of June 1959. After she obtained her secondary school diploma at the 'Amersfoortse Berg' in Amersfoort, she started with the study Human Geography of Developing Countries on the State University of Utrecht in 1977. For her specialisation 'urban geography of developing countries' a fieldwork was done in Mexico, and for the minor subject 'economy of developing countries', followed at the State University of Amsterdam, research was conducted in Malaysia. In 1987 she was temporarily attached to the Third World Centre of the Catholic University of Nijmegen to carry out her PhD research in Brazil. Since the 1st of April 1991 she is working at the Centre for Research on Multinational Corporations, SOMO.

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STELLINGEN

behorende bij het proefschrift
van Wilma Roos

Shaping Brazil's petrochemical industry, the importance of foreign firm origin in tripartite joint ventures

1.

Onderzoek naar de invloed van buitenlandse investeringen op het industrialisatieproces in Derde-Wereldlanden kan niet voorbij gaan aan het belang van de herkomst van deze buitenlandse bedrijven.

2.

Het feit dat Japanse bedrijven in de Braziliaanse petrochemische industrie positiever denken over participatie in joint ventures en sneller geneigd zijn genoegen te nemen met een minderheidsaandeel zal een tijdelijk fenomeen zijn; op het moment dat hun onderhandelingspositie verbetert zullen zij een grotere invloed opeisen.

3.

Industriële differentiatie waarbij de meer traditionele petrochemische branche wordt gereserveerd voor de nationale industriële bourgeoisie en de geavanceerde fijne chemie branche wordt beheerst door buitenlandse ondernemingen, vergroot de afhankelijkheid van Derde-Wereldlanden van het Westen.

4.

De ontwikkeling van het petrochemisch complex van Camaçari in Brazilië is een voorbeeld bij uitstek van een industrialisatie strategie die niet de beoogde regionale ontwikkeling op gang heeft gebracht. Hierdoor blijft dat deel van de bevolking dat van de positieve spill-over effecten zou moeten profiteren -de groep landloze, werkloze inwoners van het Noord-oosten van Brazilië- buiten spel staan.

5.

Het voorbeeld van een Braziliaans chemisch bedrijf dat de productie van de pharmaceutische grondstof 'acrylic acid' slechts ter hand kon nemen door middel van een geoorloofde bedrijfsspionage in Mexico, toont aan dat productdiversificatie in de richting van de fijne chemie slechts bereikt kan worden met behulp van verouderde technologie. Het is daarom de vraag of het niet doeltreffender is de productie van aspirines en andere fijne chemie producten over te laten aan buitenlandse bedrijven en de daardoor onstane afhankelijkheid van deze bedrijven voor lief te nemen.

6.

Het feit dat de afhankelijksheidstheorie voor de meeste onderzoekers die zich bezig houden met ontwikkelingsstudies als bruikbaar concept heeft afgedaan implicceert niet ook automatisch dat het geen bruikbare componenten zou bevatten.

7.

Daar realisatie van het tripartite model in de petrochemische industrie in Brazilië in hoge mate afhankelijk was van de beschikbaarheid van oliedollars en de aanwezigheid van een militaire dictatuur, is herhaling van dit model in andere ontwikkelingslanden niet mogelijk en niet wenselijk.

8.

Het succes van de internationale oriëntatie van het moderne Japan kan niet beter worden geïllustreerd dan met een bezoek aan het Musée d'Orsay in Parijs waar de toelichtingen bij de tentoongestelde werken niet alleen in het Frans en Engels, maar tevens in het Japans zijn opgesteld.

9.

De huidige hongersnood in Afrika dreigt opnieuw de stelling van logistiek te onderstrepen dat voedselhulp altijd te laat komt en daarna altijd te lang blijft voortduren.

10.

Gezien het taboe dat nog steeds rust op het gebruik van het herentoilet door vrouwen, verdient het aanbeveling om in bioscopen, theaters en congrescentra de helft van het aantal herentoiletten om te bouwen tot damestoiletten ten einde de pauzes en wandelgangen efficiënter te kunnen benutten.

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Katholieke Universiteit
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During the Brazilian miracle (1967-1973), Brazil experienced impressive growth in GNP which exceeded 10% annually. One of the factors responsible for this was the existence of a triple alliance among the strong state bureaucracy, the influential national private bourgeoisie and the large number of foreign investors. The central question of this book is to what extent has industrial development in Brazil been influenced by the triple alliance in general, and tripartite joint ventures in particular during the '70s and '80s. Special attention will be given to the role of foreign transnationals.
Using the petrochemical industry in Brazil as an example, Japanese, American and European participation in tripartite joint ventures is compared, focussing on two aspects: the stability of joint ventures structures in the tripartite model and the transfer of technology. This case study of the petrochemical complex of Camaçari, located in the state of Bahia, shows that foreign firm origin plays a decisive role in the functioning of the tripartite model. Joint ventures with Japanese companies, which had arrived more recently in Brazil, lacked technological knowledge of petrochemical production, had a different corporate culture, and were more stable than those with American and European companies.

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Wilma Roos studied the human geography of developing countries at the State University of Utrecht. From 1987-1991 she was affiliated with the Third World Center of the Catholic University of Nijmegen in the Netherlands. During this period she carried out research in Brazil.